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ERASISTRATUS, GALEN, AND THE *PNEUMA*

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Recently it has become clear that the descriptions of the physiology of Galen given in many textbooks of the history of Biology are misleading on important points.[1] In particular, it has been shown that it is wrong to state that the pulmonary artery, in Galen's view, discharged wastes from the right ventricle of the heart into the lungs or that there is an ebb and flow of blood in the veins.[2] However, the customary accounts of Galen's system may be criticized on an additional ground. Not only are they mistaken on specific points, but they are, on the whole, incomplete. It is, of course, a very difficult problem to abstract from the vast mass of Galen's works a true view of his connected system of physiology. Contradictions and ambiguities abound.[3] Nevertheless, some of the ambiguities in Galen become explained, if not removed, and the whole of his system is seen in clearer outline, when examined against the background of the earlier tradition of Greek physiology—upon which Galen was building and against which he was sometimes reacting. It is my purpose now to attempt such an examination.

The first clear account of the blood vessels as a branching system origi-

[1] Donald Fleming, "Galen on the motions of the blood in the heart and lungs," *Isis*, 1955, *46*: 14-21.

[2] *Ibid.*

[3] Owsei Temkin, "On Galen's pneumatology," *Gesnerus*, 1951, *8*: 182-4.

nating from the heart is given by Aristotle.[4] The superiority of his description seems to be based upon a genuine advance in technique, namely, that he prepared his animals for dissection by first starving them to emaciation to cause the blood vessels to be clearly outlined, and then strangling them.[5] The death of the animals in this manner causes the blood to be retained in the veins. Consequently the veins, swollen with blood, are more easily detected upon dissection. I think it probable that Aristotle's predecessors had prepared their animals for dissection according to the common method of butchers; that is, they had stunned them and bled them from the throat. As a result of this treatment the veins are left empty and collapsed, and are correspondingly difficult to find.

A peculiar characteristic of this method of killing animals by strangling is that the arterioles of the lungs close off, as a result of asphyxia, while the heart is still beating.[6] As a result most of the blood is forced into the veins and the right side of the heart. The pulmonary vein, the left side of the heart, and the arteries are left largely empty of blood.

Aristotle's description of the heart, puzzling though it is at first sight, was correct as far as it went. He considered the right auricle and ventricle to form one chamber continuous with the great veins and with the pulmonary artery.[7] His most notable omission is any mention of the heart valves.[8] A much more complete and accurate description of the heart is given in the Hippocratic work *On the Heart* wherein both the auriculo-ventricular valves and the semilunar valves of the aorta and pulmonary artery are described.[9]

In this Hippocratic work the heart is considered to be the seat of the innate heat, and respiration is considered to have as its purpose the cooling of this heat.[10] The auricles are held to act as bellows to pump air from

[4] Aristotle, *Historia animalium* 511 b 25-513 a 5, translated into English and annotated by D'Arcy Wentworth Thompson, Oxford, 1910.

[5] *Ibid.*, 513 a 10.

[6] As a result of general vasoconstriction, asphyxia produces a great increase in blood pressure culminating in heart failure. After death the contraction of the arterial walls will squeeze most of the blood into the veins. *See* Sir Charles Lovatt Evans, *Principles of Human Physiology*, 12th ed., London, 1956, pp. 664-8, 684.

[7] T. H. Huxley, "On certain errors respecting the heart attributed to Aristotle," *Nature*, 1880, *21*: 1-5. Cf. Ogle's note to 667b in his translation of the *De partibus animalium*, Oxford, 1910, and Arthur Platt, "Aristotle on the heart" in C. Singer, *Studies in the History and Method of Science*, Oxford, 1921, vol. 2, pp. 520-32.

[8] Huxley, *loc. cit.*, p. 5.

[9] Frank R. Hurlbutt, Jr., "*Peri Kardies*, A treatise on the heart from the Hippocratic corpus: Introduction and translation." *Bull. Hist. Med.*, 1939, *8*: 1104-13.

[10] *Ibid.*, pp. 1110-1.

the lung, through the pulmonary artery on the right side and the pulmonary vein on the left, to the corresponding ventricles.[11] Differences in the structure of the two ventricles are only to be expected, "for the intelligence of man is innate in the left hollow and rules the rest of the soul."[12]

The next important step in the elucidation of the structure and function of the heart and blood vessels was to distinguish clearly the arteries from the veins; for these two kinds of blood vessel had hitherto been lumped together and called by the same term, *phleps* (φλέψ), meaning "blood vessel." This distinction has generally been attributed to Praxagoras of Cos,[13] who was a pupil of Diocles and who became one of the most famous physicians of his time.[14] In making this distinction, Praxagoras observed that the phenomenon of pulsation, previously regarded as characteristic of all blood vessels, was really a movement of the arteries only.[15] Together with this distinction of arteries from the veins, Praxagoras distinguished their contents; the veins were to contain blood, while the arteries were to contain pneuma or air. This opinion was based on the observed emptiness of the arteries in animals killed for dissection by strangulation.[16]

The doctrines of Praxagoras were carried on and developed by his pupil Herophilus of Chalcedon (c. 300 B. C.) who went to Alexandria and did his work there. Herophilus gave the distinction between arteries and veins greater clarity by basing it on the difference in the thickness of their walls. Then, on this basis he called the pulmonary artery the *arterial vein*, saying that in the lungs, the veins are like arteries in general appearance and the arteries like veins. He estimated that, elsewhere, the walls of an artery are six times as thick as those of a vein.[17]

[11] *Ibid.*, pp. 1111-2.

[12] *Ibid.*

[13] John Call Dalton, *Doctrines of the Circulation, a History of Physiological Opinion and Discovery in Regard to the Circulation of the Blood*, Philadelphia, 1884, p. 38.

[14] M. Wellman, "Zur Geschichte der Medicin im Alterthum," *Hermes*, 1900, *35*: 349-84, Ref. p. 379.

[15] Dalton, *Doctrines*, p. 38. Galen, De differentia pulsuum, liber I in C. G. Kühn, *Claudii Galeni opera omnia*, 20 vols., Leipzig 1821-33, VIII, p. 498: ἡ δὲ Πραξαγόρου τε καὶ Ἡροφίλου χρῆσις ἔτι καὶ εἰς τάδε κρατεῖ σφυγμὸν γὰρ οὗτοι πᾶσαν ἀρτηριῶν κίνησιν τὴν αἰσθητὴν καλοῦσιν. "The custom of Praxagoras and Herophilus flourishes even to this day. For they call every observable movement of the arteries a pulse."

[16] Dalton, *Doctrines*, pp. 38, 39. Galen, *De diagnoscendibus pulsibus*, liber IV in Kühn, VIII, 941: τὸ μέν γε τοῦ Πραξαγόρου καὶ θαυμαστὸν ἴσως σοι φανεῖται. μηδὲ γὰρ περιέχεσθαι λέγων ἐν ἀρτηρίαις τοὺς χυμούς, ὅμως ἐκ τῶν σφυγμῶν ἰδέας τινὰς αὐτῶν ἀναλογίζεσθαι πειρᾶται. "However perhaps you may wonder that Praxagoras who, although he denies that humors are contained in the arteries, yet, from their pulsations, must attempt to distinguish different kinds of them."

[17] J. F. Dobson, "Herophilus of Alexandria," *Proc. Roy. Soc. Med. Lond.*, 1925, *18*, Historical Section pp. 19-32.

Herophilus seems to have made a more intensive study of arterial pulsation.

Herophilus, who had studied the subject more carefully, found the differences to be rather in quality, pulsation occurring only in the arteries and the heart, palpitation and spasm and tremor in the muscles and the nerves. The pulse, according to him, is born with the animal and dies with it; these other functions do not. Pulsation occurs in consequence of the filling and emptying of the arteries.[18] Again pulsation is always involuntary, since it is a purely natural movement, but the others are voluntary for often the parts are compressed or overcharged at will.[19]

To Herophilus contraction was the result of an active function of the arteries while dilatation was their normal condition. However, he held that the dilatation and contraction of the arteries originated in the heart.

Some say that the arteries do pulsate, for their walls dilate and contract just like the heart, but they do this not by any innate power of their own, but receive it from the heart. Herophilus is of this opinion.[20]

Thus it is possible to see in the succession from Aristotle, Diocles, and the Hippocratic writer, to Praxagoras and to Herophilus, a distinct improvement in knowledge—a gradual definition of fact and clarification of ideas based obviously on more, and more critical, dissection, and more

[18] Dobson mistakenly thought that Herophilus considered the arteries to be full of blood. He based his opinion on a passage from Galen. Galen, *An sanguis in arteriis natura contineatur* Chapter VIII in Kühn, IV, 731. "Although it is doubtful in what way the *pneuma*, is carried by the heart into the whole body if the arteries are full of blood, it is not difficult to solve a question of this kind and to say that the *pneuma* is not carried, but is pulled into the arteries, not from the heart alone, but from everywhere, just as Herophilus thought, and before Herophilus, Praxagoras, Philotimos, Diocles, Plistonicos, Hippocrates and many others." Since Galen is here arguing against Erasistratus he is endeavouring to show that *pneuma* can be present in the body without necessarily being distributed from the heart through the arteries. Therefore he mentions these earlier men, among them Herophilus, who had thought that *pneuma* could enter the body everywhere through the skin. However these earlier men, in distinction to Galen, had tended to consider that the vessels which they called arteries contain *pneuma*. They had merely offered two paths of entry for it. Since Praxagoras certainly did not consider that the arteries contained blood and since the names of Praxagoras and Herophilus are frequently linked together, I think it unlikely that Herophilus held views radically different from his teacher. However, Herophilus did stress the importance of the pulse and thought that, on account of the pulse, the arteries were more important for nutrition than the veins. It is not clear to me whether this nutrition was thought to be blood or *pneuma*. *See* W. H. S. Jones, *The Medical Writings of Anonymus Londinensis*, Cambridge, 1947, pp. 111-5.

[19] Dobson, "Herophilus," trans. by Dobson from *Rufus* ed. by Daremberg and Ruelle, Paris, 1879, p. 220.

[20] Dobson, "Herophilus," trans. by Dobson from Galen, *De differentia pulsum, liber* IV in Kühn, VIII, 702.

careful and prolonged observation. The progress in dissection is illustrated by the fact that whereas Aristotle's studies were restricted to the viscera and large blood vessels of the chest and abdominal cavities, Herophilus attempted the much more difficult dissection of those much less accessible organs, the brain and spinal cord, and gave names to various parts.[21]

But with Erasistratus of Chios, the younger contemporary of Herophilus at Alexandria and pupil of Metrodorus, the son-in-law of Aristotle, there is a more profound change. According to tradition Erasistratus was deeply influenced by Straton of Lampsacus, the physicist, and in particular, by his ideas of atoms and the vacuum. To whatever degree this may be true, it is quite clear that Erasistratus tried to work out the mechanical implications of the structure of the heart and blood vessels, and to create a theory of physiology which would be in strict accord with the mechanical necessity imposed by this structural arrangement. Thus we shall find that Erasistratus not only makes new discoveries in anatomy, but also introduces a novel way of thinking about the living organism.

Erasistratus' anatomical contribution, which was important to the better understanding of the vascular system, was his investigation of the heart. He appears to have discovered and named the tricuspid and bicuspid valves (of which the Hippocratic writer had remained unaware) and to have interpreted them correctly as valves, that is to say, as devices for maintaining flow in one direction. He applied the same interpretation to the semilunar valves of the pulmonary artery and aorta.

> Erasistratus, in his treatise on fevers, has described how membranes are attached to the mouths of the vessels which serve the heart in the alternate reception and expulsion of materials. . . . At the mouth of the vena cava there are three, shaped very much like spear points; whence, I suppose, they were called tricuspids (τριγλώχινας) by some of the Erasistrateans. Those at the *arteria venalis*, that is, the artery which has its ramification from the left ventricle of the heart into the lung, are of nearly the same form but not so many, for at this orifice, the membranous appendages are two in number, while at each of the remaining mouths there are three, all of them sigmoid in shape. Each of these last mouths, as Erasistratus says in his description, is a channel of exit, one of them for blood to the lung, the other for pneuma to the body, at large.[22]

Thus the function of the right ventricle of the heart is solely to supply blood to the lung through the pulmonary artery, while the left

[21] Charles Singer, *Galen On Anatomical Procedures*, London, 1956, pp. 228, 231, 237.
[22] Galen, *De placitis Hippocratis et Platonis*, Bk. VI, Chapter VI, Kühn, V, 548-50. Translated by Dalton, *Doctrines*, pp. 250-1.

ventricle supplies *pneuma*, drawn from the lung, to the whole body, via the aorta. Galen goes on to illustrate the action of the valves, according to Erasistratus.

> The use of the membranes, as he thinks, is to perform for the heart contrary functions, alternating at successive intervals. Those attached to the vessels which bring in materials, when pressed from without inward, yield to the influx of materials, and falling into the cavities of the heart, throw open its orifices and leave an unobstructed passage for what is drawn into it. For these matters, he says, do not come in of their own impulse as into a passive receptacle; but the heart itself, expanding like a brazier's bellows, distends itself by its diastole. The membranes attached, on the other hand, to the vessels of exit, act in the contrary way. For turning from within outward, they yield before the outflow, and open the orifices when the heart discharges its contents; while in the whole remaining interval they exactly close the orifices, preventing any return of what has been discharged.[23]

The consequence of his discovery of the tricuspid and bicuspid valves was that Erasistratus was to consider the heart as a unidirectional pump. The next question obviously was "What is it pumping?" Now the tradition was well established that the breath or *pneuma* was drawn from the lungs into the ventricles of the heart. Erasistratus refined and enlarged this idea by postulating that it was drawn into the left ventricle only, but that it was drawn there in considerable quantities as a result of a suction created when the ventricle enlarges in diastole. At this point I think we see the influence of Straton's vacuum, that is, the enlargement of the heart in diastole would create a vacuum in the left ventricle, as a result of which air would rush in from the lungs through the pulmonary veins. Because of the presence of the bicuspid or mitral valve, this *pneuma* brought in could not remain in the left ventricle, but must, with each contraction of the heart, be forced into the arteries whence it would be distributed to the whole body. In this view, the *pneuma* must originate from the surrounding air, and must be something which can be pumped. It cannot be of such a fine and rare nature that it will pass through the walls of the heart and arteries or else it could not be contained in them. Hence Erasistratus was obliged to insist that the *pneuma* has a certain density or thickness.

> But the pneuma which is enclosed in the arteries is not thinner than the surrounding air, as its origin indicates. For it arises, in the opinion of Erasistratus, from the air surrounding us, which he summons into the body to those first arteries which are in the lung, thereupon from them to the heart and to the others.

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[23] *Ibid.*

[24] Galen, *An sanguis in arteriis natura contineatur*, Chapter II, Kühn, IV, 706 (my translation).

It was, of course, necessary to his theory that Erasistratus should consider that the arteries contain only *pneuma*, while the veins contain blood. However, he was sufficiently experienced to know that whenever an artery was opened in a living animal, blood spurted forth from it. He explained this apparent anomaly by saying that when an artery was opened all the *pneuma* in the arteries escaped instantly, thereby creating a vacuum in the arterial system. The suction, resulting from this vacuum, caused the arteries to be immediately filled with blood which entered from the veins through the anastomoses connecting the fine tips of the arteries and veins.[25] Thus the general anastomosis of the fine branches of the arteries and veins was a necessary postulate in Erasistratus' theory of physiology.

Galen

The anatomy and physiology embodied in the many volumes of Galen's works[26] represent a great advance in knowledge over that of Herophilus and Erasistratus. There was appreciable progress in the interval between the third century B. C. and the second century A. D., but the new discoveries relating to respiration, the heart, and blood vessels made the picture more confused, not less so.

Galen wrote four different works specifically devoted to one or another aspect of the problem of respiration. These are, to list their Latin titles: 1. *An sanguis in arteriis natura contineatur* (Whether blood is contained in the arteries in Nature),[27] 2. *De utilitate respirationis* (On the value of respiration),[28] 3. *De causis respirationis* (On the causes of respiration),[29] 4. *De usu pulsum* (On the function of the pulse).[30] He also discusses the functions of lungs, heart, arteries and veins, in his *De usu partium* (On the functions of the parts).[31] The same is true of his work *De placitis Hippocratis et Platonis* (On the opinions of Hippocrates and Plato), which is especially valuable for its numerous, and frequently long,

[25] *Ibid.*, Chapter IV in Kühn, IV, 724. Cf. W. H. S. Jones, *The Medical Writings of Anonymus Londinensis*, Cambridge, 1947, pp. 103-9. The anonymous writer here presents arguments against the Erasistratean system similar to those of Galen, but lacking his critical experimental tests.

[26] Kühn ed., 20 vols.

[27] Kühn, IV, 703-36.

[28] Kühn, IV, 470-511.

[29] Kühn, IV, 465-9.

[30] Kühn, V, 149-210.

[31] Kühn, III, 1-366. This work has also been translated into French by Charles Daremberg, *Oeuvres anatomiques, physiologiques et médicales de Galien*, Paris, 1854, Tome I, pp. 141-706, Tome II, pp. 1-211.

quotations from earlier authors.[32] In addition, observations on the heart, lungs, and respiration are to be found scattered in almost every work that Galen wrote.[33]

The number and bulk of these writings alone make their summation difficult. But worse, the statements written by Galen are often obscure and hazy. Moreover, he sometimes seems to contradict in one work what he has firmly stated in another, with little recognition of the apparent inconsistency of his views. These inconsistencies are, I think, not due merely to bad memory and hasty writing, although these factors certainly enter in. The main reason for inconsistency is that the physiological writings are debating tracts issued against opposing schools of thought—on physiological questions, usually against the Erasistrateans. Thus, in his discussions, Galen frequently shifts his position in order to gain argumentative advantage. Frequently he is seeking to score debating points rather than to offer a systematic presentation. Therefore it ought to be a rule, in considering Galen's statements, to consider them in relation to the view which he is attempting to counter.

The fundamental change which Galen made in the physiology of respiration was to show that neither the left ventricle of the heart nor the arteries contain air (that is, *pneuma*), but that they invariably contain blood. In making these steps forward Galen necessarily destroyed the whole of the beautifully articulated Erasistratean theoretical structure. He thereby laid upon himself the onus of providing a new physiological system. This responsibility placed him in a considerable dilemma. It was easier to disprove the old than to create the new. The system which he did think out, bears all the marks of a series of desperate makeshifts. For those most important structures, the valves of the heart, he was unable to provide any definite function. Indeed he was forced to say, for the valves of the left side, that they did not act, as Erasistratus had seen that their structure would require them to act, namely, as devices to maintain unidirectional flow.

Galen's attack on the idea that the arteries contain only *pneuma* is contained in his short work *An sanguis in arteriis natura contineatur*. He begins by noting that whenever an artery is wounded we see blood flow

[32] Kühn, V, 211-805. Also Johannes Müller, *Claudii Galeni de placitis Hippocratis et Platonis*, Leipzig, 1874. A critical edition of the Greek text with an emended Latin translation by Johannes Müller.

[33] Curtis gives a more complete list of Galen's references to the heart and blood, *see* John G. Curtis, *Harvey's Views on the Use of the Circulation of the Blood*, New York 1915, p. 169; and of Galen's references to the *pneuma* on pp. 163,4.

out of it, and he defines the point in question as being whether the blood which flows out of an artery is normally contained in it, or merely flows into it from elsewhere.[34] Here he is dealing directly with Erasistratus' view that the blood which flows from an opened artery is not normally contained in it, but enters it from the veins. If this latter possibility were true, then the *pneuma* should be seen to escape first, before the blood pours forth. But, on the contrary, blood emerges from the opened artery at once.[35] Galen notes that this fact by itself would be sufficient evidence for the presence of blood in the arteries if the matter rested with those who are not addicted to some sect (i. e. the Erasistrateans), but, since he is dealing with unreasonable people, he must bring forward stronger evidence.[36]

Galen then shows that the *pneuma*, as defined by Erasistratus, originated from the air and therefore could not be such a rarified and subtle substance that all the *pneuma* in the body could escape in an instant through a pinprick in an artery.[37] Then too, since the heart, according to Erasistratus, is always pumping more *pneuma* into the arteries, it ought to be able to replace what little is lost through a small opening, so that there would be no need for blood to enter the arteries to fill a vacuum.[38] But, if all the *pneuma* could escape from one small wound in an artery, then such a wound ought to be followed by a profound and widespread disturbance in the body.[39] Since this does not happen, he says, the whole idea is ridiculous.

Passing from argument to observation, Galen notes that the arteries seen in the transparent mesentery of a living animal clearly contain blood.[40] Finally, after a certain amount of polemical digression, he gives his clinching proof:

> At the same time observation discredits this judgment, for, when we have everywhere tied off a dissected artery with ligatures, and we cut into the portion of the artery which had been enclosed in the middle, we have demonstrated that it is full of blood.[41]

Not content with demonstrating that blood was contained in the arteries, Galen also wished to show that it was present in the left ventricle of the heart. To do this he used a method, which he had developed, of laying bare the beating heart in a live animal by removing the sternum.[42]

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[34] Kühn, IV, 703.
[35] Kühn, IV, 704.
[36] Kühn, IV, 705.
[37] Kühn, IV, 706.
[38] Kühn, IV, 711.
[39] Kühn, IV, 716, 717.
[40] Kühn, IV, 718.
[41] Kühn, IV, 724 (my translation).
[42] Singer, *Galen on Anatomical Procedures*, pp. 179, 190-2.

I shall return again to living animals and show you that, when the heart has been laid bare, blood pours forth at once, not only if you insert a knife into its left cavity, but even if you insert a quill or needle or any other such thing. And indeed if this were so, [i. e. that the heart contains *pneuma*] the *pneuma* would have to be emptied first so that the blood would follow. For, because of the narrowness of the opening, it would have to be completed in a long, not a short, time. But it is not. The truth is as follows. Exactly at the same time as the wound is inflicted the blood flows forth, so that even if the wound is made quickly with great skill, it is not possible to snatch away the knife unstained with blood. So from this it is clear that the left cavity is full of blood.[43]

Then, having demonstrated that the left ventricle of the heart and the arteries, that is to say, the *pneuma*-conducting system of Erasistratus, is full of blood, he is faced with a question.

But how, they rejoin, does the air which we draw in, in breathing, come into the whole body if the arteries contain blood? [44]

And he replies:

To which it must be answered that this necessity compels them to acknowledge that, therefore, the whole of the air, which is taken in in breathing, is also sent back out through the nostrils. This fact has been noted by very many astute philosophers, as well as doctors, who say that the heart does not require the substance of air, but only its coolness, by which it needs to be recreated, and that this is the function of respiration.[45]

In contrast to Erasistratus, Galen did *not* think that the air in the lungs was drawn into the left ventricle of the heart to be pushed on to the whole body. The fact that the left ventricle of the heart is full of blood and the fact that Galen considered that the mitral valve does not function effectively to prevent backflow both prevent the left ventricle from drawing air from the lung in dilation without returning it in the succeeding contraction. Fleming discusses at some length the question of what, according to Galen, passed in the pulmonary vein, and in which direction. He concludes that it is unquestionable that Galen believed waste substances to pass outward from the left ventricle along the pulmonary veins to the lung.[46] I think that it was Galen's considered view that air passed into the left side of the heart from the lungs, that the air exerted a cooling influence on the heart, and was then returned to the lungs together with the waste substances.

[43] Galen, *De placitis Hippocratis et Platonis*, Bk. I, Ch. V, Kühn, V, 184 (translated from the Greek by Miss E. Nash).

[44] Galen, *An sanguis*, Kühn, IV, 724.

[45] *Ibid.*

[46] Fleming, *Isis*, 1955, *46*: 14-21.

The confusion on this point has arisen, I think, because in Galen's works statements reflecting the Erasistratean system are hopelessly entangled with those representing Galen's own views. Possibly Galen wavered in his own mind. He may always have remained partly an Erasistratean and may not always have pursued his own discoveries to their ultimate consequences. However, in those of his works wherein he concentrates his mind on the problem of respiration, he is less equivocal.

We have not yet touched upon the matter of the pulse. Erasistratus had explained the pulse quite simply by supposing that it arose from *pneuma*'s being impelled into the arteries with each contraction of the heart, so that the arteries were dilated in pulsation by being filled with *pneuma*. Galen could not postulate the same scheme for the blood in the arteries without being faced by problems which could only be solved by a theory of circulation—which certainly he never thought of. Instead he was preoccupied with the problem of giving the *pneuma* access to the whole body.

To solve this problem he supposes that the arteries act in the same way as the chest and lungs. When the lungs are dilated, they are filled with air drawn into them. Therefore, when the arteries are dilated, they become filled with blood and *pneuma*.[47] The blood is drawn into the arteries from the veins through the anastomoses which connect arteries and veins. *Pneuma*, on the other hand, is drawn into the arteries from the surrounding air through the fine pores in the skin. He emphasizes the continuity of the arterial and venous systems, by means of the anastomoses.

> And now I shall explain more clearly why this movement is from everywhere and to everywhere. In the arteries there are many openings, some like holes in their own coats and others, like mouths, end in the intestines and stomach and externally in the skin. Thus they are not only continuous with each other, but also with the heart, that is, at its largest holes, that is to say, at the arteries themselves, especially into the unobstructed broad spaces [ventricles]. But there are none such openings into the veins at the largest arteries; instead their anastomoses escape our perception. So that, if you disbelieve in their existence, you will believe because of the other things said by the ancients, and not at all because of this phenomenon. For, if one takes an animal in which the veins and arteries are large and clear as in the ox, pig, or ass, the horse, sheep, bear, ape, panther, and in man himself, or in any others resembling these, and if he wounds many large arteries, all the blood of the animal will empty out through them. And this is so if we make a test of this phenomenon many times, and throughout we will find the veins emptying like the arteries, and we shall believe that the opinion of the anastomoses from them is true. For certainly they draw [a current] from the veins, through these

[47] Galen, *De usu pulsuum*, Ch. IV, Kühn, V, 163.

anastomoses into the dilated arteries. When contracted, on the other hand, they draw it back into the anastomoses and into the veins. Just as through the mouths terminating in the skin they excrete all such vapors or smoky stuff they have. Or they take up not a little portion from the surrounding air into themselves. But this is what Hippocrates said, namely, that the whole body is breathing out and breathing in.[48]

Galen held that this alternate dilatation and contraction of the arteries originates from the heart, but that it does not arise from substance being forced into the arteries by the heart (as had been true under Erasistratus' scheme), but from an impulse which flows into the arteries through all their tunics.[49] This impulse is a dilatation wave in the coats alone, and it is this which causes the arteries to dilate and therefore to exert a suction on all their surroundings.[50] For the theory he offers an experimental demonstration.

Now first, if you wish, strip [one of] the conspicuous and large arteries of its skin, and then of the underlying and adjacent tissues so as to be able to cast a noose around it, and after this cut it open along its length and place a hollow reed or some small copper pipe into the artery in the slackened place so as to block up the wound by it and prevent the hemorrhage. Up till now they [behave] thus: upon examination, you will see it [the artery] throbbing as a whole, but when you tighten the noose around the coat of the artery at the reed, you will no longer see the throbbing beyond the noose, even though there is the passage of blood and *pneuma* through the hollow reed to the farther part of the artery just as before. But if [the cavity of] the arteries had the pulsation, they would pulsate now even to the farther part of them beyond the noose. But this is not so, so that it is clear that the force moving it is not moved by the heart itself, but is sent through the coat.[51]

According to Galen, therefore, the arteries are continually exchanging materials with their surroundings, but in relation to the heart he holds that they receive a greater amount of material and return less. The reason for this is the membranes (i. e. the semilunar valves of the aorta) borne in the uppermost part of the heart. These hinder, but do not entirely prevent, the return of materials from the arteries to the heart. Galen makes quite clear that he does not agree with Erasistratus that the valves completely prevent the entrance of material from the arteries into the heart.[52] Erasistratus had held that materials could enter the left side of

[48] *Ibid.*, Ch. V, Kühn, V, 164-6 (translated from the Greek by Miss E. Nash).
[49] *Ibid.*, Ch. IV, Kühn, V, 163, 4.
[50] *Ibid.*
[51] Galen, *An sanguis*, Ch. VIII, Kühn, IV, 733 (translated from the Greek by Miss E. Nash).
[52] Galen, *De usu pulsuum*, Ch. V, Kühn, V, 166.

the heart only from those arteries (pulmonary veins) which are in the lungs.

Galen considered that the pulse in the arteries had two functions: first, to distribute the innate heat from the heart to the various parts of the body, and second, to nourish the *pneuma zōticon* or vital *pneuma*. He was sure that the pulse had to do with the distribution of the innate heat because, when the pulse is cut off in a limb by a tourniquet, the limb gradually grows cold and pallid.[53]

To return to the relationships in the vicinity of the heart, Galen provides a more extensive discussion of these in his *De usu partium*. He says:

> In the whole body, the arteries communicate with the veins and exchange air and blood with them by means of extremely fine invisible openings. If the large opening of the arterial vein [pulmonary artery] were always equally open, and if Nature had not discovered a means to close and open it alternately, the blood would never have penetrated into the arteries by narrow invisible openings, when the chest is contracted. . . . When the chest is contracted, the arteries of the lung with venous tunics [pulmonary veins], being compressed and crowded together forcefully in every part, force out at the same moment the *pneuma* that they contain, and in exchange, they are filled with particles of blood through those narrow ducts. This would never have been possible if the blood had been able to retrace its path by the great opening which exists by that vein from the side of the heart. In actuality, when the vein has been compressed, in every part, the blood, finding the passage across the great opening closed, penetrates in fine drops into the arteries by these narrow conduits.[54]

This passage demonstrates that Galen realized that the arrangement of the heart valves and the general anastomosis of arteries and veins require some transfer of blood from the pulmonary artery (arterial vein) to the pulmonary vein. However, since he thought this transfer consisted of an exudation of drops which, in any case, depended on the expansion and collapse of the lungs, with the rise and fall of the chest, it cannot be said that he knew of the pulmonary circulation, in our sense of the term. Nevertheless, he was familiar with all the elements of the pulmonary pathway. Fleming raises the question of whether this blood which is forced from the pulmonary artery to the pulmonary vein then passes back along the pulmonary vein to the left ventricle of the heart. He concludes that Galen leaves this matter unclear.[55] If now we consider what things, according to Galen, pass through the pulmonary vein we find that there are three possibilities:

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[53] Galen, *De usu pulsuum*, Ch. III, Kühn, V, 160.
[54] Galen, *De usu partium*, Bk. VI, Ch. X, Kühn, III, 455-7.
[55] Fleming, *Isis*, 1955, *46*: 17.

(1) Blood passing inward to the left ventricle.

(2) Air passing from the lung to the left ventricle (and back again?).

(3) Wastes or " something like smoke " passing outward from the left ventricle of the heart and to the lungs.

Of these three possibilities the only one about which Galen is completely unequivocal is the last. With regard to air entering the heart he says in some places that it does not pass from the lungs to the heart, but that only its coolness is transmitted to the heart.[56] In other places he says that the heart does require the substance of the air.

> As we have seen respiration in animals exists in the interest of the heart which both needs the substance of the air and being consumed with heat desires in addition the refreshing cooling which it thereby obtains. Entering with its cooling power the air refreshes the heart. In passing out it carries with it effervescent, burnt and smoky particles. . . . The heart . . . in dilating draws towards itself and in contracting empties itself.[57]

The contradiction in these statements derives, I think, from the fact that Galen continually feels the need to argue against the Erasistratean physiology. To say that the heart requires the substance of the air, in Erasistratean terms, is to say that the heart is constantly drawing air from the lung to pass on to the rest of the body. As a result less air should be breathed out than was previously breathed into the lung, because, in the interval, the heart will have removed some air from the lung to transmit to the rest of the body. Therefore, what Galen means when he says that the heart does not consume the substance of the air, is that the heart is not passing the air on to the arteries and the whole body. On the other hand, he cannot conceive that the air can exert its influence of " refreshing cooling " on the heart without actually entering into the left ventricle via the pulmonary veins and passing out again.

In general Galen believed that the pulmonary artery (arterial vein) existed for the purpose of nourishing the lung with blood. In this he agreed with Erasistratus.[58] Galen held that the blood was formed in the liver from the food material absorbed from the intestines and carried to the liver through the hepatic portal vein. From the liver some of the blood passed via the inferior vena cava to the right ventricle of the heart.

[56] Galen, *An sanguis*, Kühn, IV, 724, *De utilitate respirationis*, Ch. II, Kühn, IV, 479-80.

[57] Galen, *De usu partium*, Bk. VI, Ch. II, Kühn, III, 412, Daremberg I, 381 (trans. after Daremberg).

[58] *See* footnote 22.

Other blood would descend through the inferior vena cava to the veins of the lower part of the body and ascend through the superior vena cava to the veins of the upper part of the body.[59] For Galen, like Aristotle, regarded the superior and inferior venae cavae as one blood vessel extending the length of the trunk, arising from the liver, and at one point opening into the right side of the heart.

Galen rejected Aristotle's view that the number of cavities in the heart depend on the size of the animal. He says:

> Actually the largest animals do not have three ventricles and the smallest do not have only one. The horse, which is a very large animal, has a heart formed exactly like that of the smallest sparrow. Dissect a mouse, an ox, or any other animal smaller than a mouse, if there be such, or larger than an ox, the number of the ventricles is the same and the structure of the heart is identical. Nature has not considered the largeness or smallness of bodies in varying the form of the organs; it has no other purpose than difference of action and even this action it determines on a basis of utility.[60]

He goes on to show that fishes have only one ventricle in their heart, because they have no lung, but instead breathe by gills. Thus he correlates the existence of the right ventricle in animals with the need to provide nutrition for the lung.[61] He says elsewhere:

> For I have observed in all kinds of living things that the right cavity of the heart perishes and is brought into being at the same time as the lung.[62]

Galen correlates the thick tunics of the arteries throughout the body with the need for the arteries to hold in the *pneuma*, contained in their blood. On the other hand, the veins have thin tunics in order to facilitate the distribution of nutrient from the blood to the body.[63] The reason then for the reverse situation in the lung, that is for the thick wall of the arterial vein (pulmonary artery) and the thin wall of the vein-like artery (pulmonary vein), is the constant expansion and contraction of the lung by the wall of the chest. It should be noted that Galen realized that the chest movements resulted from the action of the intercostal muscles and that the lung was moved by the chest rather than the chest by the lung, as Herophilus had believed.[64] Galen believed that under these conditions

[59] Galen, *De placitis Hippocratis et Platonis*, Bk. VI, Ch. IV, Kühn, V, 535.
[60] Galen, *De usu partium*, Bk. VI, Ch. IX, Kühn, III, 442-3.
[61] *Ibid.*
[62] Galen, *De placitis Hippocratis et Platonis*, Bk. VI, Ch. V, Kühn, V, 540.
[63] Galen, *De usu partium*, Bk. VI, Ch. X, Kühn, III, 447, Daremberg I, 409.
[64] J. F. Dobson, "Herophilus of Alexandria," *Proc. Roy. Soc. Med. Lond.*, 1925, *18*, Hist. Sect., pp. 19-32. *See* Galen, Kühn, XIX, 318.

of expansion and contraction, and because of its light, foamy nature, the lung requires a thin, light and vaporous blood.[65] In the lung, since the coat of the arterial vein (pulmonary artery) is thick, it allows only the finest and subtlest portion of the blood to escape.

In his discussion of the heart Galen describes accurately the openings with their valves. He believes that the heart has a strong power to attract substances out of the vessels connected with it. The auricles, on the other hand, he considers to contract so as to push material into the ventricles.[66] He says of the heart:

> The heart thus endowed with all the attractive powers that one can imagine, hastily takes into the depths of its cavities the materials streaming in, which it seizes and gulps down, so to speak. Thus, take whatever term of comparison you will, for instance, the distended bellows of the blacksmith, which become swollen with indrawn air; you will recognize that the same power exists in the highest degree in the heart; or the frame of a lamp which draws oil; you will establish that this faculty is not lacking either in the heart, the source of the innate heat; or as the stone of Heraclea which attracts iron, thanks to the affinity of its properties for this metal [you will find the heart equally possessed of this kind of attractive power].[67]

This assumption of a strong attractive power in the heart leads Galen into error, for it causes him to conclude that substances may leak back into the left ventricle of the heart from the aorta and prevents him from basing his conclusions upon the consequences of the simple mechanical action of the aortic valve.[68] He does, however, interpret the function of the auricles correctly, considering them to be reservoirs for the accumulation of substances (i. e. blood in the right auricle, blood and air in the left), so that the ventricles may be rapidly filled when they dilate.[69]

Galen also understood correctly the action of the tricuspid and bicuspid valves and considered them an excellent manifestation of the artistry of divine providence. He notes that their arrangement is such as to permit them to close rapidly and tightly. But in the case of the bicuspid or mitral valve in the left ventricle, he again thought there was some leakage to

[65] Galen was proceeding on the assumption that all flesh is formed by a solidification of blood. Thus a dark, thick, heavy flesh, such as liver, is formed from a dark, thick, heavy blood. Therefore, a light-coloured, porous, foamy flesh, such as lung, must be formed from lighter and thinner blood.

[66] Galen, *De usu partium*, Bk. VI, Ch. XV, Kühn, III, 480-1.

[67] *Ibid.* (translated from the Greek by Miss E. Nash).

[68] Galen, *De usu pulsuum*, Ch. V, Kühn, V, 167.

[69] Galen, *De usu partium*, Bk. VI, Ch. XV, Kühn, III, 484.

allow the smoky residues generated by the innate heat in the left ventricle to pass outward through the *arteria venosa* (pulmonary vein) to the lung.[70]

In discussing the ventricles of the heart Galen speaks in the *De usu partium* as if the left ventricle contained air or *pneuma*, although in the *De placitis Hippocratis et Platonis* he proves experimentally that the left ventricle contains blood. Since, in each of these works, he refers to the other, it is difficult to tell which was written later. Neither is any clear clue given in the book on his own works, for they appear to have been written close together.[71]

In the *De usu partium* Galen notes that the left ventricle is larger and has a thicker wall than the right. This thicker wall has two functions. It is, in the first place, more appropriate for enclosing the air in the left ventricle. In the second place, the greater weight of this thicker wall in the left ventricle helps to counterbalance the weight of the blood in the right ventricle. He observes that when the chest is open both ventricles are seen to beat and both cavities contain both blood and *pneuma*, but in the left cavity the *pneuma* exists in much larger proportion.[72]

In this wall between the two ventricles Galen postulated anastomoses of the same kind as those which connect the fine tips of arteries and veins. These allow the passage of the finer portion of the blood from the right ventricle to the left.[73]

Since these anastomoses cannot be seen, Galen deduces their existence in the interventricular septum from the general arrangement of the heart. He says:

> And secondly the [presence of these anastomoses has been assumed] from the fact that, of the two orifices in the right ventricle, the one conducting blood in and the other out, the former is much the larger. For the fact that the insertion of the vena cava into the heart is larger than the vein which is inserted into the lungs [i. e. pulmonary artery] suggests that not all the blood which the vena cava gives to the heart is driven away again from the heart to the lungs. Nor can it be said that any of the blood is expended in the nourishment of the actual body of the heart since there is another vein [i. e. the coronary vein] which breaks up in it and which does not take its origin nor get its share of the blood from the heart itself. And even if a certain amount is so expended, still the vein leading to the lungs is not to such a slight extent smaller than that inserted into the heart as to make it likely that the blood is used as nutriment for the heart: the disparity is much

[70] *Ibid.*

[71] Galen, "On his own books" in A. J. Brock, *Greek Medicine*, London, 1929, p. 177.

[72] Galen, *De usu partium*, Bk. VI, Ch. XVI, Kühn, III, 491-2.

[73] Galen, *On the Natural Faculties*, with an English translation by A. J. Brock, Loeb Classical Library, London, 1916, p. 321; in Kühn, II, 207-8.

too great for such an explanation. It is, therefore, clear that something is taken over into the left ventricle.[74]

What Galen did not understand were the laws governing the flow of liquids through tubes. For it is because the blood in the pulmonary artery is under higher pressure and therefore flows more rapidly, that the small pulmonary artery can conduct away from the right ventricle of the heart as much blood as the large venae cavae bring to it. In the light of the physics he did know, Galen's postulate of the anastomoses in the interventricular septum was not unreasonable. He applies the same argument to the left side of the heart, showing that the vessels bringing *pneuma* from the lungs are much smaller than the aorta which leads out from the left ventricle, and says that this would suggest that the left ventricle not only gets *pneuma* from the lungs but also blood from the right ventricle.[75]

Galen's pneumatology

When we come to consider how the *pneuma* works in the context of Galen's physiologic system, just described, we find how radically he has departed from the doctrine of Erasistratus. For Erasistratus had supposed that the *pneuma* was taken into the lungs in breathing, drawn from the lungs into the left ventricle of the heart through the pulmonary veins when the heart expanded in diastole, and pumped by the left ventricle into the aorta when the left ventricle contracted in systole. From the aorta the *pneuma* passed through the arteries to the whole body. Some of the *pneuma*, passing by way of the carotid arteries to the brain, collected in the ventricles of the brain, to form the *pneuma psychikon*. This *pneuma psychikon* then was transmitted through the nerves to the body. Muscular contraction, for instance, was considered by Erasistratus to be brought about by the passage of *pneuma* through the nerve into the muscle, where it caused the muscle to swell and inflate like a balloon, thereby making it shorten. Thus all the *pneuma* in the body was derived from the outer air; it was *epiktaton*, that is, it had an external origin.[76]

The followers of Hippocrates, on the other hand, also thought that the *pneuma psychikon* was derived from the outer air, but they thought that it came directly to the brain through the nostrils, presumably via the olfactory nerves.[77]

[74] *Ibid.*, p. 323, Kühn, II, 209.
[75] *Ibid.*
[76] J. F. Dobson, "Erasistratus." *Proc. Roy. Soc. Med. Lond.*, 1927, *20*: 825-32.
[77] Galen, *De utilitate respirationis*, Ch. V, Kühn, IV, 502.

Galen disagreed with both these schools, because he held that the source of the *pneuma psychikon* was internal and that it arose as an exhalation of the blood.[78] The blood exhaled this *pneuma* under the influence of the innate heat. He says:

But if the breath of the blood is required for the nutrition of the *pneuma psychikon* (for it is reasonable that this is so), healthy animals would receive the greatest value from moderate heat. For how would cold blood be released into breath? But moderately warm blood can easily be scattered in cloudy and smoky vapours.[79]

A paramount influence is thus given to the *innate heat*, and Galen makes clear that he regards the principal function of respiration to be the maintenance of the innate heat.[80]

However, in discussing the purpose of respiration, Galen makes a thorough review of the opinions of his predecessors.

What is it, therefore, that is of such enormous value to us in respiration? Is it the generation of the soul itself, as Asclepiades said? Or is it, indeed, not generation, but a kind of strengthening, as Praxagoras, son of Nicarchus, said? Or a kind of ventilation and refreshing cooling of the innate heat, as Philistion and Diocles used to say? Or nutrition and refreshing cooling, as Hippocrates said? Or is it none of these things, but instead do we breathe for the sake of filling the arteries, as Erasistratus thought? . . . And first, when all of the opinions, described above, have been arranged under two headings, we shall attempt to discover which is truer. For some seem to postulate a substance, which is inspired from the air, and others indeed, a quality. Therefore, those who say that the soul is generated and nourished, and that the arteries are filled, claim only an essence. Those who say that the soul is fanned, strengthened, and refreshingly cooled, a quality.[81]

Galen's own opinion is that it is a quality which is drawn in in respiration, and he educes various arguments to show that when animals suffocate, it is not on account of the lack of the substance of the air, but on account of something else.

It may be shown clearly that what Erasistratus said, that it is impossible for the heart to take up air from the lungs during the stoppage of respiration, is wrong. For let anyone, who will, experiment on himself, so that he inhale thousands of times, and press his chest from all sides and expiring nothing, for the heart will appear pulsating, as before, in him. However, if a man be suffocated, he will be so the more rapidly, the more he inhales. . . .

Clearly, these three things destroy the doctrine of Erasistratus. Firstly, that the heart can draw air during the stoppage of respiration, for the chest shows nothing [unusual] at this time. Secondly, that we suffocate more rapidly when we inhale

[78] Galen, *De usu partium*, Bk. VI, Ch. XVII, Kühn, III, 496.
[79] Galen, *De utilitate respirationis*, Ch. V, Kühn, IV, 506-7.
[80] *Ibid.*, Ch. IV, Kühn, IV, 493.
[81] *Ibid.*, Ch. I, Kühn, IV, 471-2.

more, and thirdly, that if we compress the chest everywhere strongly and violently, during the stoppage of respiration, the air is not consumed by the heart, but the animal tries to exhale, for the former is a means of suffocation. Certainly, it clearly follows from these things that animals are suffocated not on account of the lack of the substance of the air, but on account of something else.[82]

Since, then, it is not the substance of the air which is used in respiration, what is that quality which respiration provides? Galen assumes that respiration is carried on for the sake of the *innate heat*, and after a survey of the various opinions of his predecessors on the influence of respiration on the innate heat, he says:

For it is needful that everyone should say something about the *innate heat*, especially concerning its conservation, even though he could not express his opinion articulately, and it is for this reason, I think, that some write refreshing cooling, others fanning and still others strengthening. *But I think that they are impelled to these things from the facts which appear in connection with flames, for we see that they perish as rapidly when deprived of air.* . . . If, therefore, it be found that finally flames are extinguished while undergoing conditions of this kind [closed spaces], it could also be discovered, it is certain, what use the innate heat of animals derives from respiration. Towards its discovery we shall pursue all the ways in which flames seem to be extinguished and increased. For they seem to be extinguished not only if one enclosed them in a hollow space, but also in baths and in the heat of the sun, and excessive cold, and when violently blown upon, and by a mass of material heaped over them, and, on the other hand, by a lack of fuel. However, they are increased and strengthened by moderate cold, and if moderately ventilated, and when the abundance of fuel has been moderated.[83]

Further on, he compares the *innate heat* in the heart to a lamp burning in a gourd.

For you may rob a flame of light by suffocation or by completely depriving it of oil. Place the heart analogous to the wick, the blood to the oil, and the lung to the organ, for it surrounds the heart like a gourd. When an animal inhales, it is, I think, similar to a perforated gourd,[84] but when respiration is prevented at the appropriate place on the trachea, you may compare it to a gourd unperforated and everywhere closed. Therefore, a perforated gourd cannot extinguish a flame within itself because of the breathing through the holes, but, [when the openings through which it is breathing are closed], this extinguishes it immediately by suffocation. In the same way, an enclosed lung extinguishes [the innate heat] because of the hindering of respiration, whereas a perforated and rare lung, because of respiring, conserves the *innate heat*.

But I, when I see that the fire which did not have ventilation is extinguished,

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[82] *Ibid.*, Ch. II, Kühn, IV, 479-80.

[83] *Ibid.*, Ch. III, Kühn, IV, 487-8 (translated from the Greek by Miss E. Nash, italics mine).

[84] That is, with death, the *innate heat* and *pneuma* escape from the heart and from the body.

and then, when it is opened, it breathes out so much smoke, and next inspires as much of the pure outer air, and when both things have been done, flames up, I reason that there is not a little usefulness to exhaling, in emptying the 'flame-smoke' of the blood. For ashes, fumes, and smoke, and all superfluity of material of this kind around the burning matter tend to extinguish the fire no less quickly than water. . . . Certainly, these ideas have no scientific persuasion nor necessary demonstration of the kind we have always adduced in the function of other things, yet they do not completely lack evidence; the swiftness of the death of an animal requires such a cause.[85]

Then, having presented his evidence, Galen draws his conclusions:

Therefore, from the fanning of the source of the *innate heat* itself, and from its moderate cooling, and from an outflow of something like smoky mist, all act together, namely, towards the conservation of the innate heat.[86]

This is a most prescient analogy, this one between fire and respiration. It lays down the line of thought which was pursued further by Hooke, Boyle, and Mayow in the seventeenth century, and which was ultimately vindicated in the studies of Lavoisier on respiration. Furthermore, these passages show that the views of Galen, however strange they may seem now, were reasoned concepts, carefully built up from observation and experiment. Toward this problem which he did not, and knew that he could not, solve, he retained a tentative and essentially scientific attitude.

To summarize Galen's views on respiration, we may say that he held that the principal manifestation of life in the body of man and animals was warmth, and that this *innate heat* was comparable to fire in its requirements. It needed air lest it be smothered. On the other hand, it needed to be cooled, lest, like a cooking fire, it should burn up too hot and bright, burning up all its fuel and injuring the body with its excessive heat. Galen thought that air served to cool this *innate heat* as well as nourish it.

The principal seat of the *innate heat* was in the left ventricle of the heart, but it also existed more moderately and diffusely throughout the body and was nourished in every part by the arteries which lead, via the aorta, from the left ventricle of the heart.

In the act of inspiration, according to Galen, air is drawn in through the mouth and nostrils, larynx, and trachea, into the lungs. The lungs then provide a reservoir of cool air which surrounds the heart. Some of this air may be supplied directly to the left ventricle of the heart. Galen

[85] Galen, *De utilitate respirationis*, Ch. III, Kühn, IV, 491-2 (translated from the Greek by Miss E. Nash).

[86] *Ibid.*, Ch. IV, Kühn, IV, 493 (translated from the Greek by Miss E. Nash).

assumed that the bronchi in the lungs formed anastomoses with the pulmonary vein (arteria venosa). When the heart dilated in its diastole, it drew air by suction through these anastomoses and along the pulmonary vein into the left ventricle, where this air served to ventilate and cool the *innate heat* of the heart which he likened to a flame.[87] Upon the contraction of the heart in systole, most of the air in the left ventricle passed back along the pulmonary vein (arteria venosa) accompanied by fumes and smoky vapours given off by the "flame" in the heart. Galen's insistence on the return of the air from the heart to the lung points up his opposition to the views of Erasistratus. Some of the air might serve to nourish the *pneuma psychikon,* but Galen held that it was more probable that *pneuma* arose as an exhalation of the blood under the influence of the innate heat.

From the left ventricle of the heart, waves of dilatation and contraction passed out along the walls of the aorta to all the arteries in the body, thereby producing the pulse. This view—diametrically opposed to that of both Erasistratus and Harvey—held that the dilatation of the arteries created a suction which, on the one hand, drew blood from the veins through the fine anastomoses between the tips of arteries and veins, and, on the other, drew air both from the heart and from the air outside the body through the pores in the skin. This process—the pulse—thus produced an aerated or "pneumatiferous" blood in the arteries and gently maintained there the *innate heat.* Upon the next contraction of the arteries, the blood flowed back through the fine anastomoses into the veins, and (presumably) the air flowed back out through the pores in the skin.

In conclusion, it is of interest to note that Galen was aware of the difference in colour between venous and arterial blood, although he considered that the blood was the same blood in both cases. He says:

> For the blood is the same, which is contained both in the right ventricle of the heart and in all the veins throughout the whole animal, and it corresponds to that which is held in all the arteries and which exists in the left ventricle. The latter, however, is thinner and more golden (ξανθότερον), never, on the other hand, thicker and blacker, but always hotter.[88]

Galen's designation of the arterial blood as "more golden" than the venous seems perhaps a little unusual. In the Renaissance Latin editions of his works this was translated as "flavior" which is the same word that Michael Servetus applies to the colour of arterial blood.[89]

[87] *Ibid.*, Ch. III, Kühn, IV, 484.

[88] Galen, *De placitis Hippocratis et Platonis*, Bk. VI, Ch. IV, Kühn, V, 537.

[89] J. J. Izquierdo, "A new and more correct version of the views of Servetus on the circulation of the blood," *Bull. Hist. Med.*, 1937, *5*: 914-32.

JAPAN'S ENCOUNTER WITH WESTERN MEDICAL SCIENCE:

"The Beginning of Dutch Study,"

being the Memoirs of an 18th-Century Doctor.

EIKOH MA

"Im Anfang war die Tat." (Goethe)

I. Introduction and Historical Background

According to Toynbee, the encounter of different civilizations is always an interesting theme to study (1). Here I will introduce a document which is an example of this. It is a book of Memoirs written in 1815. The author, Gempaku Sugita, was a Japanese doctor in the service of a provincial feudal lord. Writing at the age of 83, he recalls his younger days about a half-century before and treats of the tremendous efforts made to decipher Western medical books. Since it is the first translation from a Western language, we might call it a landmark in modern Japanese cultural history. To use Toynbee's terminology, it is a Japanese response to the Western challenge in the field of culture, which attitude effectually protected her from Western colonization. It was the dawn of Westernization, while the feudal system was in twilight.

The wave of Western influence had reached Japan as early as 1541, when for the first time a Portuguese ship came to Kyushu. Three years later the gun was brought in, and nine years later the first Catholic missionary arrived. From that time on, trade and Christianity began to prosper together, moving from the Western district toward central Japan. Furthermore, Western influence was beginning to penetrate Japanese culture. Had this situation not been abruptly halted, Japan's Westernization would have taken place two centuries earlier than it did. Catholic Christianity was, however, forbidden by Hideyoshi in 1589, and only trade was allowed. During the early years of the Tokugawa Shogunate, the Japanese were so open-minded to foreigners that the Portuguese came to Nagasaki to trade, the Spaniards to Uraga, and the Dutch and English to Hirado. Christianity again became influential. Then came the last and most thorough-going suppression: missionaries and Chris-

tians were expelled and executed. The Shogunate's seclusion policy was strictly enforced to bar the intrusion of the West. The single exception was Deshima, an islet in Nagasaki Bay, where only the Dutch were allowed to stay and trade, the Portuguese having been defeated in competition. After 1641, Deshima was the sole channel for the introduction of Western ideas. Thereafter, the introduction of Western civilization was monopolized by the Dutch, and that under extreme limitations. So when Engelbert Kaempfer (2), a German doctor, came to Japan in 1690, he had to disguise his nationality. Throughout the Tokugawa period the Dutch ware-house at Deshima was a source of exotic curiosities and new ideas. In every Dutch ship sailing towards the East there was without exception a doctor. When the Dutch were allowed to stay at Deshima, Dutch doctors also stayed. Some of them, like Kaempfer, because of their brilliance in scholarship and technique, exercised great influence on Japanese medicine. It was during this period that the early so-called Dutch school of surgery or Casparian surgery originated.

There was a Dutch Captain (3) appointed by the government in Holland and recognized as a kind of consul at Deshima. There also, under the strict control of the Japanese authorities, trade was carried on. The Captain used to be required to pay an annual visit to Edo to have an audience with the Shogun, where his coming was eagerly anticipated by some officials of the Shogunate and by scholars who were eager to gain knowledge of the West. The annual visits of Dutchmen to Edo lasted from 1609 to 1850, for almost 250 years. The Captain usually was accompanied by a Dutch surgeon and Japanese interpreters. They stayed without fail at Nagasaki Inn in Edo for two or three weeks. During their stay, a great many scientists and doctors came to the Inn to have an interview with Dutchmen and interpreters. Gempaku Sugita, the author of the Memoirs, taken by Ryotaku Maeno, went there also to get information on the study of Dutch. But they were disappointed by an interpreter (4). People loved imported new instruments as curiosities; among them were weather-glasses, thermometers, Leyden-bottles, dark-chamber cameras, projectors, megaphones, etc. (5). The interpreters' families—the profession was hereditary like many other professions in those days—monopolized knowledge of the Western language. Since the Captain's stay in Edo was limited, it was difficult to learn the language from him. Therefore people who desired to absorb knowledge of the West had to go to Nagasaki. To Japanese intellectuals disciplined in the Chinese classics and used to the Chinese way of thinking, a glimpse of the new civilization seemed extremely fresh and attractive. Some of them, dissatisfied with Confucian

philosophy, may have been attracted to the West in search of a new way of thinking (6). This was a period of looking "through a glass darkly," or perhaps not even this. It has been alleged that the interpreters who should have been the best linguists in Dutch, were not permitted to read it, but only to speak it (7), and that not until 1744, as a result of their complaints, were three interpreters allowed to read Dutch (8), while the rest were still officially separated from the written heritage of the West. The Shogunate was nervous enough to confiscate an inoffensive essay and prohibit its publication merely because several Western letters were inserted. The Shogunate attitude came from the extreme fear of the propagation of Catholic Christianity. However, the people's passionate quest for Western science and technology defied all these prohibitions. "Dutch Study" implied for them practical Western sciences, such as medicine and related sciences. Hence it was quite natural that pioneers in "Dutch Study" arose in medical circles. Early in the 18th century they secretly procured dictionaries from interpreters in Nagasaki and tried to conquer the unknown world. The author of the Memoirs mentioned above, Gempaku Sugita, was one of the distinguished pioneers in this field. There was an official interpreter named Nishi, who, after transferring his profession to his son, became a surgeon, because he had learned medicine from the Dutch by making use of his professional position. He founded the Nishi school of surgery in Edo, the so-called Dutch school, and under him the young Gempaku studied. Later, during the Captain's stay at Nagasaki Inn, he studied surgery with Yoshio, a Nagasaki interpreter who was well-known for his skill in surgery. There he had an opportunity of witnessing the first exsanguination operation performed in Edo by a Dutch surgeon (9). According to the Memoirs, people had studied surgery from Dutch doctors, not through verbal study but through merely following their example in operation and prescription (10). Since many medicines used in Europe were unavailable in Japan, they had to treat patients with indigenous substitutes (11). In the Memoirs, Gempaku tells us of the trends of the time, of the growth and spread of "Dutch Study" despite the Shogunate's suppression, and how he struggled to study and eventually gained the leadership of the influential circle called the "Dutch school." The spontaneous formation of this "school" meant to Japan what the establishment of the Royal Society meant to England, in the sense that it was the awakening of the experimental spirit. Now, in the following section, I shall try to put into English as faithfully as possible the most dramatic parts from the Memoirs.

II. *Rangaku Kotohajime* (12): or, The Beginning of Dutch Study

The Memoirs of Gempaku Sugita

A Translation (13)

As time passes, though few people are well informed concerning Western knowledge, they no longer hesitate to study it. Although the study of Dutch is not yet officially permitted, people who possess Dutch books have increased, and they do not care what the authorities think of it. One day in the spring of the eighth year of Meiwa (1771), I suppose, Jun-an Nakagawa, one of my fellow-doctors, brought to me two Dutch books on anatomy: *Tafel Anatomia* (14) and *Casparus Anatomia* (15), which, he said, somebody at the Captain's Inn would sell to those who wanted them. I could not read a single word, but the illustrations of viscera and skeleton were obviously quite different from those we had studied. Since I thought that these illustrations must have been based on experiment, I was very eager to possess the books. Since my family had been called "Dutch school surgeon" for generations, I wanted to have these books especially on my book-shelf. Being very poor at the time, however, I could not afford them; so I took them to a lord steward in our clan and asked him to buy them. Fortunately, acting on the advice of a friend, he bought them for me. Thus for the first time, I owned Dutch books.

My friends and I used to speak with admiration of Dutch natural science; indeed, we thought it would be very useful if Dutch books could be translated into Japanese. Unfortunately no one had attempted this difficult task. It might have been done by some Nagasaki interpreter, but in Edo it was impossible. Even if only one book were translated, it would become a great national profit. We used to think of this with the greatest regret.

Once, when I got hold of a Dutch anatomical book by chance, I wanted to check the illustrations against a real corpse. Fortune seemed to favour me in the beginning of the study, for I got a note from a procurator in the evening of the third of March, telling me that the very next day the corpse of a criminal would be dissected, and that I might come to witness it. Since I had heard of the falsehood of old theories from a friend who had seen such a dissection, my heart leaped for joy. Even though it was then late in the evening, I wanted to share my good fortune with some enthusiastic fellow-doctors, Jun-an Nakagawa and others. Hastily I let them know by sending messengers through Edo in every direction. Although I had had little intercourse with Ryotaku Maeno, who was ten

years older than I, it seemed he should not miss the opportunity, since he had been so profoundly interested in the study of medicine. On that evening he was at Nagasaki Inn. I managed to send a messenger to him too.

The next day we assembled at the appointed place. Taking a Dutch book from his bosom, Ryotaku said, "This is *Tafel Anatomia*, a Dutch anatomical book that I bought in Nagasaki a few years ago." We were struck by the coincidence. That was the very same edition as the book I had at home. Ryotaku showed us the illustrations and taught us several Dutch words he had learned in Nagasaki, such as *hart* (heart), *long* (lung), *maag* (stomach), and *milt* (spleen). All of us were quite surprised at their unfamiliar shapes, none of which we had seen before in Chinese medical books.

Then we went to Kotsugahara, the execution-ground where the dissection was to be carried out. The corpse of the criminal was that of an aged woman of about 50 years, nicknamed *Aocha Baba* or Old Mother Green Tea, born in Kyoto. It was an old *éta* (16) butcher who made the dissection. We had been promised an *éta* named Toramatsu, known for his skill in dissection, for the dissection on that day, but because of his sudden sickness his grand-father came in place of him. Although 90 years old, he was a healthy fellow and told us that he was experienced in dissection, having dissected bodies from his youth. According to him, in dissection up until that time, people had left it in *éta* hands, and he had taught them where the lungs, kidney, and other organs were. After such instruction, they had pretended they had studied directly the internal structure of the human body. Since the viscera naturally had not been labelled, people had to be satisfied with the butcher's pointing them out, and they asked no more. On that day, too, the old butcher, pointing here and there, showed us the heart, liver, gall bladder, stomach, and the other previously unknown things. Their proper positions he had learned by experience, without, however, knowing their names. According to our anatomical tables, some of them turned out to be artery and veins and suprarenal body. The old butcher also told us that none of the attending doctors ever bothered to identify them. Comparing the various organs with the illustrations in the anatomical tables, Ryotaku and I confirmed the accuracy of each of them. We could not find such things as the six lobes and two ears of the lungs, and the three lobes on the left and four lobes on the right, of the kidneys, as had been described in the old medical books. The structure of the lungs and liver and the position and shape of the stomach and intestines were quite different from what had been believed according

to old Chinese theory. I had heard that one official doctor had performed such dissections seven or eight times and each time had noted the same variation from traditional medical theory. He had published a paper questioning whether there were any anatomical differences between Chinese and Japanese. After the dissection, we wanted to examine the shape of a skeleton; so we picked up some bleached bones on the execution-ground. Here again we admired the accuracy of the Dutch anatomical tables.

On the way home, we talked with excitement about the experiment. Since we had served our lords as doctors, we were quite ashamed of our ignorance of the true morphology of the human body, which was fundamental knowledge of the medical art. In justification of our membership in the medical profession, we made a vow to seek facts through experiment. All of us agreed. Then I suggested that we decipher *Tafel Anatomia* without the aid of interpreters in Nagasaki, and translate it into Japanese. Ryotaku said that although he had been wishing to begin the study of Dutch, he had had no good friends to study with. He suggested that we begin the study by making use of what he remembered of the little Dutch he had learned in Nagasaki.

The next day we assembled at Ryotaku's home and began the conquest of *Tafel Anatomia*. But we felt highly embarrassed and as helpless as a small boat without a helm sailing through an ocean. We did not know what to do. Ryotaku, however, had long been planning such a study and had been to Nagasaki to learn Dutch words and grammar. He was a highly respectable person, some ten years older than we; hence we regarded him as our natural leader and obeyed him as our teacher. I, who had not yet learned even the alphabet, began to study the 25 letters and then went on to learn some words.

In discussing how to begin, we thought it would be too difficult to learn the terms for internal organs first. So we began with the first diagram, which was of the front and back sides of the human body, for the names of the external features were already known to us. We checked the symbols of the diagram and explanation. This was our first step in the translation, which was later completed in a volume treating of morphological terminology.

At the beginning, since we did not comprehend such auxiliary words as *de* (the), *het* (the, it), *als* (as), *welk* (which), our gradually increasing vocabulary was of no value in conjecturing the meaning of the sentences. For instance, we spent a whole long spring day pondering over such a simple line as "*wyn-braauwen* (the eyebrow) is the hair which appears

over the eye." On another day, when we met the word *vooruitsteekend* (17) in the explanation of the nose, we could not understand it. In those days we did not yet have a Dutch-Japanese dictionary (18). The only help was a small Dutch dictionary (Dutch through Dutch), which Ryotaku had brought from Nagasaki. In it we found a note on *vooruitsteekend* as " a cut-end of a branch of a tree *vooruitsteekend*," and also " a dust-heap *vooruitsteekend*." We pondered over the word for a long time as usual but still could not understand it. Then at last I got the idea that the cut-end of a tree would be lifted up when recovered, and also a dust-heap was lifted up; therefore I suggested that it be translated as "lifted up." Every one thought this very reasonable, and it was agreed to be a fitting translation. I did not know how to express my joy at the moment; I felt as if I had found the most precious jewel in the world.

Thus we translated by conjecture, word by word, and gradually these increased in number. In such a word as *zinnen* (spirit), however, we were far from a correct conjecture. When we met difficult words, we thought we would get them someday, so we marked them with a cross in a circle, which we called a " bridle cross." How often we had to mark with bridle crosses! In this way we met together six or seven times a month without fail, on the appointed days, and labored on with much toil. After a year when our translation work had advanced a little, we seemed to arrive at a better understanding of the country. We had advanced so far as to be able to decipher ten lines or more a day without much difficulty. Sometimes we consulted interpreters on their annual visit to Edo each spring. Sometimes we observed dissections. Sometimes we ourselves dissected animals and examined them. After two or three years of hard study everything became clearer to us; the joy of it was as the chewing of sweet sugar-cane (19). The appointed days of meeting were as impatiently awaited as are festivals by children. In the meantime other people of like mind joined us. Since I had made up my mind to publish the translation as soon as possible, each evening I wrote down what I had learned at the meeting that day. Elaborating expressions, the manuscripts were rewritten eleven times in four years, until at last they were put in the hands of a publisher (20).

This is our *Kaitai Shinsho* or " New Manual of Anatomy " (21). The new translation, *Kaitai,* was given in the place of *Fuwake,* or disection. And spontaneously a new term, *Rangaku,* or " Dutch Study," or " Dutch School," arose from our society and has spread and become popular all over Japan. Although it has been two centuries since Dutch surgery was first conveyed to this country, until our attempt no medical book in

Dutch had ever before been translated. We tried an anatomical book by accident. Is it not providential, however, that we began with anatomy, which is so fundamental to medicine?

After finishing the translation, we feared that some adherents of Chinese theory might not believe us, for very few people had ever heard of Dutch theory. Therefore, as the first step, we published *Kaitai Yakuzu* or "Synoptic Atlas of Anatomy" (22), which consisted of only 5 pages of anatomical illustrations and explanatory notes. It looked like a brochure. Just a glimpse at it would have enlightened people as to the serious difference from the old theory.

Before publication I was reminded of the fact that the publication of a certain pamphlet on Holland, *Oranda-Banashi* (23), had been prohibited merely because it contained the alphabet. I was not sure whether we were forbidden to discuss any country of the West, or whether we might regard Holland as an exception. I feared I would certainly violate the prohibition if I published secretly. Since our translation, however, contained no alphabet, and since our true purpose was the development of medical science, as would be seen by any reader, I believed it would be all right. Therefore I decided to publish it and to emphasize it as an initial effort in the field of translation. I presented copies to the Shogunate authorities, to several important officials, and to some nobles in Kyoto, without incident. This was the beginning of the translation of Dutch books in this country.

III. The Mss. of the Memoirs and the Decline of Dutch Study

The fate of the manuscripts of the Memoirs, "The Beginning of Dutch Study," by Gempaku Sugita, is a strange one. The MS. possessed by Gempaku's descendant was destroyed by the great earthquake in the second year of Ansei (1855) in Edo, and a copy, hand-written by Gempaku himself and presented to Bansui Otsuki, his brilliant disciple, was also lost for a long time. 53 years after it was written, it was rediscovered by chance by Kohei Kanda (24), president of Kaisei School, one of the forerunners of Tokyo University, at a second-hand book stall in Tokyo. Since it had been for a long time the object of search, several people made copies at once. Although Dutch Study was no longer predominant, having given way to English, French, and German studies, the rediscovery was welcomed because it treated of the genesis of the study of the West in this country. One of its enthusiastic readers was Yukichi Fukuzawa, the well-known founder of Keio University. Known chiefly as a pioneer in

English Study, he had studied Dutch also in his younger days, when it was still popular. Many details of his *Lehrjahre* in the study of Dutch in Nagasaki and in Osaka may be found in his "Autobiography," in his unique style. He used to say that he never read the Memoirs without being inspired and stimulated by the great efforts of his predecessors. Fearing that the MS would be lost again in the turbulent age of the Civil War, he visited a fourth generation descendant of Gempaku and arranged to finance its publication. This was in the second year of Meiji (1869). Later it was re-published by the Medical Society of Japan in the 23rd year of Meiji (1890). In the above translation, a text of the Iwanami Bunko edition, annotated by Dr. Ogata, was used.

Since everything has its beginning and end, I would like to add a few words about the decline of "Dutch Study." It took place about a hundred years after the publication of the translation, *Kaitai Shinsho* by Gempaku et al., in 1774. With the collapse of the Bakufu and the establishment of a new government under Emperor Meiji in 1868, everything came under a new order. When, however, in the 2nd year of Meiji (1869), the earliest scientific institution of a Western character, Shamitsu-kyoku (literally, "Institute for Chemistry") was located in Osaka by the Government in order to avoid the Civil War in progress in Tokyo, a Dutch official, Dr. Gratama, was invited to be chairman and to give lectures on physics and chemistry in Dutch. This is considered to be the earliest, systematic education in physics and chemistry in this country. In this institution, the precursor of Kyoto University, in addition to Dutch, both English and French were taught, but in a few years Dutch gave way to these languages. In Tokyo, the German system was adopted with the foundation of a new Western medical school (25), since the superiority of German medicine was asserted by a certain Dutch professor (26). This institution was the forerunner of the Medical College of Tokyo University. Consequently, after playing an important role in introducing Western civilization to this country through almost three centuries, Dutch retired from the scene.

IV. Biographical Remarks

In the above-mentioned cooperative work of translating *Tafel Anatomia*, Ryotaku Maeno took the leadership. He was undoubtedly a distinguished pioneer in "Dutch Study." Born in Kyushu, he became an orphan when young and was adopted by his uncle, a physician. Ryotaku's eccentricity was caused by his erudite but eccentric foster father. He always told

Ryotaku to learn and preserve for posterity the art which was going to decay and be forgotten by the world. So besides studying medicine, Ryotaku devoted himself to learning a kind of unpopular music and also some kind of *Kyogen*. No doubt it was this eccentric turn of mind which also drove him to study the Dutch language (27). However, notwithstanding his leadership in the study group, his name was omitted from the title page of *Kaitai Shinsho*. He had taken his first step in the study of Dutch under the leadership of Kon-yo Aoki and later had been to Nagasaki on leave of absence. On the way he visited Temman Shrine at Dazaifu to make a vow that he would never seek fame until the completion of his "Dutch Study," for his aim in studying Dutch was not to get fame, but to serve the world. So in spite of Gempaku's request, he steadfastly refused to permit the use of his name in the book. In the Memoirs, Gempaku mentions him with much respect, as follows:

> The members of the group naturally differed in what they wanted. Our leader, Ryotaku, was a brilliant person, and he regarded the study as his life work. He was so ambitious that he mastered the language in order to learn of the West. He became so proficient that he was able to read any book. So he devoted himself to the study of a standard dictionary which was like the *Kang-Hsi* Dictionary in the study of Chinese. He avoided social intercourse and always kept indoors, being sometimes absent even from his duty. Fortunately his lord recognized his eccentricity and condoned his occasional non-attendance. He even encouraged him by presenting him with Dutch medical books. Later Ryotaku used the pseudonym "Ranka," which meant Dutchified or a Dutch spectre, for his lord used to refer to him jokingly as a Dutch spectre. (28)

About Gempaku, the Memoirs themselves testify most eloquently. About his attitude in the Dutch Study and translation he says,

> Unlike other members of our group I was concentrated on the translation of that book only, and had no other ambition but its early publication. No matter how beautifully multi-colored strings were, I decided to take one color of red or yellow and would discard all the rest. (29)
>
> Poorly talented as I was, I tried to write it down myself. As it was the very first attempt in translation from Dutch, I had nothing to do with some undecipherable parts in fine detail, so I left them untouched. My principal purpose was to make the outline clear and comparable to what had been described. Sometimes I put in Chinese equivalents, sometimes I invented new terms, sometimes I translated Dutch pronunciations into Chinese characters, making various efforts and re-writing the manuscript eleven times. (30)

I will try to give a brief biographical sketch of him from another angle. Gempaku's pseudonyms are worth mentioning. One of them is "Isai," which, according to a distinguished linguist, Fumihiko Otsuki, comes

from the name Jesse in the Old Testament (31): "And there shall come forth a rod out of the stem of Jesse, and a Branch shall grow out of his roots" (Isaiah 11:1). It is not clear how Dr. Otsuki reached this conclusion, but in Dutch Jesse is written "Isai." It is probable that Gempaku got a Dutch Bible and read it, because in Protestant Holland Bible distribution was considered a form of missionary work. Of course, Christianity was a forbidden religion in those days, and a mere suspicion might have threatened his life. Although we cannot assert positively that he was a Christian, he was such a modest person that he believed that without the blessings of Heaven a successful translation of the *Kaitai Shinsho* would be impossible. He believed also that he could do nothing in his medical profession without the guidance of God. This we see reflected in some of his Japanese and Chinese poems. The origin of Gempaku's pseudonym, "Isai" is, however, still open to question.

His other pseudonym is "Kyuko," which means "Nine Blisses." According to his interpretation, the Blisses are: 1. Being born in a peaceful time, 2. Being raised in the capital, 3. Being friendly with both nobles and commoners, 4. Enjoying longevity, 5. Receiving a stipend, 6. Not being too poor, 7. Being famous in the world, 8. Having many offspring, 9. Being old but vigorous.

He was a busy doctor, and he "examined about a thousand patients a year over a period of about fifty years, so the total number must have been quite large" (so says his essay) (32). Having become famous as an outstanding doctor, he eventually had the honor of having an audience with the Shogun. His thoughtfulness and solid character are revealed by his "never visiting again the powerful and noble after they recovered," and also by his making no distinction between the rich and the poor.

V. Notes and References

1. A. Toynbee: *A Study of History*, Vol. VIII (Oxford University Press, 1954), pp. 88 ff.

2. Engelbert Kaempfer (1651-1716), was a German doctor who, invited by the Dutch East Indies Co., came to Nagasaki in 1690 and stayed at Deshima for two years. He became close friends with some of the Japanese people and taught the Dutch language to one young man. Through his friends he obtained knowledge of Japan, especially of history and of natural history. He visited Edo (Tokyo) twice and had an audience with Tsunayoshi, the fifth Shogun, who was interested in the Dutch sciences. Undoubtedly Japanese scholars and interpreters were stimulated by him. His *Flora Japonica* and other books were to many Europeans their early introduction to Japan.

3. The head of the Dutch warehouse in Nagasaki used to be called "Captain."
4. *Rangaku Kotohajime*, annotated by Tomio Ogata (Iwanami Bunko, 1959), p. 16.
5. *Ibid.*, p. 18.
6. E. H. Norman: Ando Shoeki and the Anatomy of Japanese Feudalism, *Transactions of the Asiatic Society of Japan*, 1949, Third Series, Vol. 2: 236-242.
7. *Rangaku Kotohajime*, p. 12.
8. *Ibid.*, p. 12. Recent studies show that the facts mentioned in 7 and 8 are not true; cf. Itazawa: *Nichiran Bunka Koshoshi no Kenkyu* (1959), pp. 133-134.
9. *Ibid.*, p. 19.
10. *Ibid.*, p. 8.
11. *Ibid.*, p. 8.
12. *Rangaku Kotohajime*: Written in 1815, published for the first time by Yukichi Fukuzawa in 1869, and then by the Medical Society of Japan in 1890. Current editions and references are:
    1. *Rangaku Kotohajime* annotated by Tomio Ogata (Iwanami Bunko, 1959).
    2. *Oranda Kotohajime* annotated by Koichi Uchiyama (Chuokoronsha, 1948).
    3. *Kotei Rangaku Kotohajime* annotated by Shinjiro Wada (Tozai Igakusha, 1950).
    4. *Rangaku Kotohajime* (An attempt to revive the original MS.) *Igaku no Ayumi*, 1951, Vol. 11, No. 4.
    5. *Rangaku Kotohajime* translated into modern Japanese by Tomio Ogata (Kogakusha, 1959).
    6. Tomio Ogata: Progress in the Study of *Rangaku Kotohajime* (in Japanese), *Bungaku*, 1947, Vol. 15, No. 7.
    7. Masabumi Tomita: *Oranda Kotohajime* and *Rangaku Kotohajime*; On the MS. owned by Mr. Fukuzawa (in Japanese), *Shigaku*, 1950, Vol. 24, Nos. 2, 3.
    8. Special Issue on the 140th Anniversary of the Death of Gempaku Sugita (in Japanese), *Nihon-Ishigaku-Zasshi*, 1958, Vol. 8, Nos. 3, 4.
    9. K. Mitsukuri: The Early Study of Dutch in Japan (in English) *Transactions of the Asiatic Society of Japan*, 1877, Vol. 5, Part 1: 207-216.
    10. D. Keene, *The Japanese Discovery of Europe* (London: Routledge and and Kegan Paul, 1954), pp. 28-37.
    11. C. R. Boxer: *Jan Compagnie in Japan, 1600-1817*. (The Hague, Martinus Nijhoff, 1936), pp. 43 ff.
13. The translation covers in contracted form pp. 23-46 of Ogata's *Rangaku Kotohajime*. The text covers 60 pages in it.
14. *Tafel Anatomia*: This is not the formal title of the book. The formal Dutch title is *Ontleedkundige Tafelen, benevens de daar toe behoorende Afbeeldingen en Aanmerkungen, Waar in het Zaamenstel des Menschelyken Lichaams, en het gebruik van alle des zelfs Deelen afgebeeld en geleerd word.* In het Nederd. gebr. doo Ger. Dicten. Amsterdam, 1734. Probably the title comes from Latin, *Tabulae Anatomicae*, found in the illustrated

title page. It is a translation from German, *Anatomische Tabellen*, Danzig, 1722, by Johan Adam Kulmus (1689-1749).

15. *Casparus Anatomia*; The formal title is *Anatomia nova* by Casparus Bartholinus (1589-1629), a Dane.

16. *éta*: The name of the people who belonged to the lowest class in the feudal caste system; they were engaged in the meanest occupations, such as slaughter, execution, etc.

17. No Dutch word is given for this in the Memoirs, but its equivalent in Japanese phonetic alphabet, which sounds something like *furhefhend*. Professor Ogata observed that there is no such word on the page treating the definition of the nose in *Tafel Anatomia*, and it must be Gempaku's mistake. However, would it not be unreasonable to guess that Gempaku made a mistake about his brilliant moment of success in deciphering *Tafel Anatomia*? It seems reasonable to refer this word to *vooruitsteekend* on the page (J. A. Kulmus: *Ontleedkundige . . .*, Amsterdam, 1734, p. 120), supposing some variation through rendering into Japanese phonetic alphabet.

18. Dutch-Japanese dictionary: Sampaku Inamura (1795-1811), found a copy of *François Halma's Woordenboek der Nederduitsche en Fransche Taalen*, Leiden, 1781, in his master's study. Thereupon he made up his mind to edit a Dutch-Japanese dictionary by putting in Japanese instead of French. After great efforts it was published in 13 volumes, in 1796, under the title *Tozai-Inkai*. It contained more than 80,000 words. Only about 30 copies were distributed among his friends and acquaintances. It was said to have been "printed," but actually only Dutch words were printed with wooden type, while all the Japanese equivalents were written in by brush, by hand! This dictionary was useful even before its completion in the first translation about Western internal medicine, *Gorter*, by Genzui Udagawa, which was published in 15 volumes in 1793. More than 20 years before the publication of *Tozai-Inkai*, Gempaku and others had had to struggle along their way helplessly, like "a small boat without a helm sailing through an ocean."

Tozai-Inkai, or *Halma-Wage*, was an absolute necessity for any student of Dutch Study, but because of its extremely limited publication of only 30 copies or so, it was not widely available. Therefore a young man edited a smaller Dutch-Japanese dictionary by selecting 27,000 important words and phrases from *Halma-Wage*, publishing it, in 1810, in a work entitled *Yakuken* or "Key to Translation." It consisted of two volumes, "Heaven" and "Earth." The "Volume of Heaven," or Vol. 1, contained from A to O in 356 pages, and the "Volume of Earth," or Vol. 2, contained from P to Z in 232 pages with 66 pages of medical terms. As to typography, two points are worth noticing. First, in spite of its being entitled "type-printed," individual wooden type was not used, but a whole page was engraved on a block of wood, which was then cut vertically into two or three pieces. These were called "types." Although the first

Publication Act in this country was issued in 1722, block-print publishing had been strictly censored from the beginning, but type-print publishing was permitted. This was because block-printed material could easily be reprinted, while type-printed material could not, once the type was distributed. Moreover, in those days type-printing was merely a dilettante's hobby or used in some very special private publication, its circulation being considered strictly limited. This was another reason for the lax censorship on it. Editing a Dutch dictionary was still a heterodox enterprise in those days.

Second, the first edition of *Yakuken* was printed on paper as thin as the India paper used in most dictionaries today. The material was a kind of very thin paper produced in Nashio in Hyogo Prefecture. Although it was thin, it was not transparent, because a kind of white clay occurring near Nashio was used as tamping material, and the surface was very smooth. When an Oxford graduate brought India paper to England, the Clarendon Press of Oxford University printed 24 copies of the Bible on it, the thickness of a copy being a third of that of an ordinary Oxford Bible. This was the year 1842 (33), some 32 years later than the publication of the first edition of *Yakuken*. Not until 1875 did the English succeed in manufacturing India paper (34). Therefore we may claim Japan's priority in the technique of making thin paper for dictionary use. A hundred copies of *Yakuken* were published in the first edition, and 14 years later several hundred copies were reprinted.

19. Chewing sugar-cane: A sugar-cane becomes sweeter from the top towards the root, so this is an idiomatic phrase symbolical of accelerating interest.

20. They started the translation in March 1771, and published it in August, 1774, so the work took three years and five months. Actually, however, it was finished before the publication of *Kaitai Yakuzu* (January, 1773), so it took them only a year and a half to finish the translation; an amazingly speedy job.

21. *Kaitai Shinsho*, 1774, in 5 volumes; 4 volumes of text and a volume of illustrations. This is not exclusively a translation of *Tafel Anatomia* but actually also other theories are introduced and adopted from 6 anatomical books. The most interesting fact is that it is not written in Japanese but in literary Chinese.

22. *Kaitai Yakuzu*, 1773, preceding by a year and a half the publication of *Kaitai Shinsho*. It consisted of only five sheets of paper; an introduction, illustrations of skeletal, visceral, and vascular systems, and explanatory notes respectively.

23. *Oranda-Banashi* or "Essay on Holland," published in 1765. Rishun Goto, a botanist, treated in it of what he heard in his interviews with Dutchmen at Nagasaki Inn.

24. "Preface by Yukichi Fukuzawa to the edition published in 1890." *Rangaku Kotohajime*, p. 120. The re-discovery of the MS. by Kanda made it

possible for Fukuzawa to publish it. The merit of these two people can not be exaggerated; however, recent studies tell us that the MS. discovered by Kanda had no evidence of Gempaku's own hand-writing, nor is it the sole MS. Today, seven different, hand-written MSS. have been found. By comparing these MSS., an attempt to revive the original has been made. Cf. *Rangaku Kotohajime* annotated by Ogata.

25. B. Hasama: Geschichtliche Daten über die Ersteinführung des deutschen Medizinalwesens in Japan, *Sudhoffs Archiv für Geschichte der Medizin*, 1933, *26*: 329-334.
26. *Kinoshita Mokutaro Zenshu* (Iwanami Shoten, 1951), Vol. 12, p. 79.
27. *Rangaku Kotohajime*, p. 14.
28. *Ibid.*, pp. 37-38.
29. *Ibid.*, p. 39.
30. *Ibid.*, pp. 42-43.
31. Y. Manabe: *Senken Gunzo* (Kanao Bunendo, 1943), p. 66.
32. *Keiei Yawa*, 1810, an essay by Gempaku Sugita. Modern edition (Tanjun Seikatsusha, 1936), annotated by B. Takiura, p. 39.
33. *The Periodical* (Oxford University Press, Dec. 1886), p. 17.
34. *Ibid.*, p. 18.

MEDICAL MEN AND THE BEGINNINGS OF VETERINARY MEDICINE IN AMERICA *

J. F. SMITHCORS

Colonial America had no veterinary profession, nor did the first graduate veterinarian come to these shores until 1800. Although earlier the animal disease problem was of minor significance, toward the end of the colonial period it began to take on serious overtones.[1] The first public figures to call for the establishment of a veterinary profession in America were Benjamin Rush [2] and James Mease.[3] Their active interest in veterinary matters, however, apparently died with them, for no event leading to the establishment of a veterinary profession can be attributed directly to their influence. In 1847, shortly after the death of Mease, and three decades after that of Rush, there were reputed to be only 15 graduate veterinarians in the United States, all from European schools.[4] During the half century from 1820 to 1870 a slowly increasing clamor for the establishment of veterinary schools can be noted, the principal advocates of which were physicians, or men with a medical background. This paper deals with the efforts of these men, many of them otherwise unknown, but whose contributions in the aggregate comprise an important chapter in the history of veterinary medicine in America.

In many respects the veterinary history of 19th century America had a close parallel, a century earlier, in that of Europe. There, despite repeated urging of prominent men, many of them physicians, little was done until a series of devastating animal plagues forced a revision of the prevailing philosophy. Scientific veterinary medicine began with the estab-

* With support of a grant from the American Veterinary Medical Association.

[1] J. F. Smithcors: Animal disease in Colonial America. *Bull. Hist. Med.*, 1958, *32*: 171-176.

[2] J. F. Smithcors: The contributions of Benjamin Rush to veterinary medicine. *J. Hist. Med. & Allied Sc.*, 1957, *12*: 13-20.

[3] J. F. Smithcors: James Mease, M. D., On the diseases of domestic animals. *Bull. Hist Med.*, 1957, *31*: 122-131.

[4] Louis A. Merillat and Delwin M. Campbell: *Veterinary Military History of the United States.* Kansas City, Missouri: The Haver-Glover Laboratories, 1935. 2 vols. Vol. 1, p. 129. The 7th census reports 46 veterinarians in the United States in 1850, but some of these undoubtedly were non-graduates.

ment of veterinary schools in France in the 1760s, and had spread over most of Europe by the end of the century.[5] The first major improvements in veterinary practice in Great Britain had come from the hands of medical men, starting with William Gibson,[6] who about 1720 was the first of a series of physicians and surgeons to turn from human to animal medicine. One of the strongest proponents of the London Veterinary College, founded in 1792, was John Hunter,[7] and following his death Sir Astley Cooper became one of the powers behind the school.

An incisive statement of the situation in America about 1870 was made by D. E. Salmon, later first Chief of the Bureau of Animal Industry, and one of the most eminent veterinarians the United States has produced.[8] About this time a major controversy had arisen over the supposed role of "wolf teeth," the rudimentary first premolars of horses, as the cause of an ophthalmia which frequently is coincident with the eruption of these teeth. As reported in the agricultural press, the weight of opinion favored those who believed in a causal relationship, and professional men who voiced a dissent often were made the subject of ridicule by men whose experience was limited to a few observations. Dr. Salmon's evaluation of this situation applies equally well to almost any other so far as the prevailing opinion of the value of veterinary medicine was concerned. Salmon states:

> The opinions of veterinarians have not only been treated as valueless, but in many cases have been ridiculed. There seems to be no limit to the numbers who, with the assurance that ignorance and self-conceit always give, are ready to place one or two poorly observed cases against all the observations of the veterinary profession on this point, as well as against the established facts of anatomy, physiology and pathology. I admit the profession has so far established few claims to recognition in this country, but our stock owners can thank themselves for it, for it has been their indifference and want of sympathy that has kept it in an undeveloped state. As a member of that profession, however, I wish to record

[5] The school at Lyon opened in 1762, Alfort in 1765; there were 20 schools in ten countries by 1800.

[6] J. F. Smithcors: William Gibson, surgeon-farrier, on fevers. *Medical History*, 1958, *2*: 210-220.

[7] E. A. Gray: John Hunter and veterinary medicine. *Medical History*, 1957, *1*: 38-50.

[8] Daniel E. Salmon, Bachelor of Veterinary Science (Cornell, 1872), was the first graduate of a four-year program in America. He was awarded the D. V. M. degree in 1876. Instrumental in the establishment of the Bureau of Animal Industry (1884)—now the Animal Research Service of the U. S. D. A.—he served as Chief from 1884 to 1905. Under his direction the Bureau achieved a notable record in eradication and control of numerous diseases which had threatened the existence of the American livestock industry. He was President of the A. V. M. A. in 1897-8.

my objections to this 'relic of barbarism'—this tradition from the superstitious quacks and horse-jockeys of the past.[9]

This was but one of many such relics—many far more barbarous—practiced by stock owners and ignorant farriers, against which educated men from the time of Rush and Mease had protested. Even many intelligent stock owners were guilty of these practices, in part because they placed too much faith in men who pretended to a knowledge of such matters. In surveying the American agricultural journals for the first half century after the first[10] was established in 1819, it is strikingly evident that many of the more intelligent communications on animal disease came from physicians. These most frequently were men in rural areas who were stock owners themselves, or who did what they could—in the absence of veterinarians—to alleviate the distress of animals belonging to clients. This is particularly true of the period prior to 1860; after this time many of the journals had regular veterinary departments edited by competent veterinarians.

The contributions of physicians during this period fall into three major categories: the reporting of disease; the urging of more rational treatment; and the advocacy of veterinary education. Others, including veterinarians, also made contributions along these lines, but physicians comprised the largest group at this time that was capable of writing intelligently on all aspects of this area. Many of these men remain anonymous, but this apparently was a characteristic of the times for reporting in the agricultural journals. At least few even remotely suggest they might be debasing their profession by writing on animal disease; most of them are on record to the contrary.

It is perhaps of more than passing interest that the first communication on animal disease in the agricultural press—in 1819—was by a physician. Although articles on animal disease reported by medical men had appeared earlier in medical journals—and these form a valuable record—this medium had little circulation outside the medical profession. The contributions of physicians and *bona fide* veterinarians in the early agricultural journals stand in stark contrast to the typical offerings by laymen. The latter are characterized by heroic—and frequently barbarous—treatments, "which had never been known to fail." The fact that many of

[9] D. E. Salmon: Wolf teeth in horses. *Country Gentleman*, 1873, *38*: 554.

[10] A few attempts to publish agricultural journals had been made earlier, but the *American Farmer*, Baltimore, 1819, edited by John Skinner, is acknowledged as the first successful journal in its field.

the "diseases" reported were wholly imaginary undoubtedly accounts for many "cures," once the animal had recovered from the treatment.

In a series of unsigned articles "On the murrain of horned cattle" in the *American Farmer* for 1819, the author—obviously a physician—states that this is a subject "not unworthy of attention" by physicians, who are more capable of dealing with this problem than any other group, since "there is no treatise on brute diseases deserving even that name; nor can there be, in the present state of that art of healing." This science, he says, is a century behind all others. He doubts that "the murrain" can be the cattle plague (rinderpest)[11] of Italy because of its sporadic nature, and he suggests poor food and muddy water as the most probable causes. The symptoms he describes make it practically certain that this disease was Texas fever (piroplasmosis), the so-called "bloody murrain," which Mease had investigated in the 1790s. It comes as no surprise that this man, like Mease, failed to find the cause or mode of infection inasmuch as this depends upon exposure to the protozoon-carrying ticks from immune carrier cattle.[12] To advance the study of animal disease he suggests that a medical board be attached to each agricultural society.[13]

Tetanus had been a problem of some proportion in both man and animals since early colonial times. A physician writing in 1826 states: "This disease much more frequently occurs in that useful animal [the horse], than farriers, and those who pretend to know something about it, are willing to allow . . . ignorance of a disease will ever lead to mischievous and destructive practice." He observes that injuries to the feet and docking the tail frequently end in tetanus. Protrusion of the third eyelid, the so-called "haw," he says is only a symptom, and he deplores the common practice of excising it to "cure" tetanus.[14]

In 1831, the report that "blind staggers" was prevailing "to a considerable extent" in Massachusetts led the editor of the *New England*

[11] Rinderpest, which ravaged Europe during the 18th and 19th centuries, was never imported into the United States. That this was due more to good luck than good intentions—prior to 1860 at least, when quarantine measures were enforced—is evident from the fact that there were several importations of contagious pleuro-pneumonia and foot and mouth disease of cattle, the first in 1843.

[12] Ticks were implicated in the 1860's, but full proof was not adduced until the 1890's with the epochal work of Theobald Smith and his associates. Merillat and Campbell, *op. cit.*, vol. 1, p. 384, state: "The unwritten record of contemporary observers . . . gives principal credit to Kilbourne [F. L. Kilbourne, B. V. M. Cornell 1885], and next to him, Salmon," rather than to Smith, who earlier had ridiculed the tick theory of transmission.

[13] Anon.: On the murrain of horned cattle. *American Farmer*, 1819, *1*: 51, 60, 99.

[14] Anon.: Lockjaw in horses. *American Farmer*, 1826, *8*: 253.

Farmer to request the eminent physician, James Thacher,[15] to investigate the disease. Thacher writes that he was unable to comply, but did secure a lengthy description of the outbreak from a Dr. Thompson. The latter says he is " in no measure qualified to write on the epidemic . . . (and) I shall not make any attempt at veterinary style." He acquits himself most satisfactorily, however, noting that of about 100 horses attacked over a two-month period, 75 died after exhibiting the typical symptoms of unsteady gait, pain, and delirium associated with this form of meningitis. In keeping with present-day findings, the only post mortem lesions were those of inflammation of the " brain." Treatment by the farmers, he says, " was wholly empirical," and included " filling the ears with various substances." He recommended bloodletting, as did all veterinarians of this period.[16]

Physicians frequently attended their own stock, and, as a favor, that of clients also. One such " M. D." writes in 1830 on a " Caesarean operation performed on a mare." He had bought a pregnant mare with a deformed pelvis, hoping to get the foal which had been sired by a famous horse. He performed a ventral section, but the foal was dead, and the mare died. Undaunted, he gives the details of the operation:

> . . . because it is a case of some novelty, and that other persons meeting with similar cases may be induced to try the same experiment . . . had the operation been performed at an earlier period, I would certainly have saved the colt, and perhaps the mare also.[17]

This appears to be the first report of a section performed on a mare in the United States, and is noteworthy for this fact, if not for the outcome of the case. Relatively few sections have been performed with both mare and foal living until recently—after the advent of antibiotics.

In 1843, a Dr. Andrew Campbell [18] of Ohio describes his experiences with an outbreak of hog cholera in which the affected animals " resemble precisely the cases of cholera that I often witnessed here in 1833," the

[15] Thacher did make a number of contributions to the agricultural journals, including the first report on the use (by a farmer) of straws as " milking tubes." He notes that this may be helpful in relieving a painful udder or for a " hard milker," but warns that " serious difficulties " may ensue continued use (*American Farmer*, 1824, *6*: 118). Improper use of the milking tube by farmers is still the bane of veterinarians attempting to control mastitis.

[16] Arad. Thompson: Epidemic in horses. *New Eng'and Farmer*, 1831, *10*: 77, 108.

[17] " M. D.": Caesarean operation performed on a mare. *American Farmer*, 1830, *12*: 101.

[18] Andrew Campbell: New disease in swine. *American Agriculturist*, 1843, *1*: 286.

date of the first known outbreak of this disease.[19] He describes the disease and notes that treatment is of no avail—as was the case until the development of an effective serum in the early 1900s. He adds:

> I hope you will consider it no descent from professional dignity for an M. D., backed by some half dozen diplomas from distinguished Medical Societies, to doctor a pig.

To this, the editor of the *American Agriculturalist* replies: "Dr. C. need not fear that the dignity or laurels of his profession will suffer in this or any other quarter, by attending to, and describing the disease of any of the animal creation, however humble." [20]

In a later communication on "Inflamed eyes of the horse," Campbell states that he is overly busy with his regular practice, "but while we assume to ourselves the guardianship of the four-footed part of creation, let us discharge the duty in that manner that shall at least entitle us to the virtue of humanity." He mentions that the common practice of blowing powdered glass and alum into the horse's eye is the reason that "many a noble roadster has been prematurely consigned to a cart or the treadmill." [21]

In a series of articles on "Diseases of animals," beginning in 1846, Andrew Stone, M. D., of Indiana, states:

> Medical men generally are turning their attention to animal medicine and agriculture, as sciences intimately connected with their own profession. . . . We may justly consider, that a malpractice in regard to brutes, that shall occasion an undue suffering and sacrifice of life, is attended with a degree of moral responsibility at least proportionate to human life itself. The way, then, must be opened by medical men; they alone, at present, as a general thing, can give system, order, and science to the study, and I am happy to see that animal medicine and agriculture are no longer beneath their notice.[22]

Stone makes a valuable contribution to the geography of disease in his rebuttal of the widely circulated reports that "the West" (now the mid-west) was unfit for stock raising, stating:

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[19] This communication is of major importance in dating the first appearance of hog cholera in America. Salmon, in his history of the disease (1887) gives this as the "probable" date, but Merillat and Campbell, *op. cit.*, vol. 1, p. 178, state: "The evidence adduced, however, is unconvincing." The Patent Office Report for 1860 positively states the disease was first recognized in Ohio in 1859.

[20] This will probably strike a responsive chord with Dr. Richard E. Shope, who was made an honorary member of the A. V. M. A. largely for his work on swine diseases.

[21] Andrew Campbell: Inflamed eyes of the horse. *American Agriculturist*, 1843, *2*: 24.

[22] Andrew Stone: Diseases of animals. *American Agriculturist*, 1846, *5*: 19.

As regards sheep husbandry in this section of the country, an important consideration presents itself. To supply the want and demand occasioned by the immense tide of immigration . . . . millions of sheep must be brought in. These, like ourselves, who have been raised and accustomed to a healthy climate and soil previous to our arrival here, but poorly bear the change; hence sheep and other animals become subject to new diseases, the result of new causes and influences. It is in this way that the intelligence has gone forth that sheep will not do well on the western prairies . . . . (but) this is a sweeping conclusion drawn from isolated circumstances.[23]

A major predisposing cause of disease, Stone says, is the periodic inundation of the flat prairies, alternating with seasons of drought—something unfamiliar to residents newly from the East. He relates the keeping of sheep on wet pastures to the incidence of liver damage, undoubtedly from flukes. Of some interest is his statement that: "A diseased or affected sheep never should be allowed to remain with the healthy . . . (but) should be instantly removed to its proper place—the hospital." At best, a hospital at this time and place would be a "sick ward" in the barn—but many farmers made no attempt to house their sheep.

A signal event in the history of American veterinary medicine was the arrival of a ship's surgeon, George H. Dadd, M. D., in Boston about 1845. There appears to be some doubt as to whether Dadd was a graduate physician, but he was very well educated, and his writings show him to have had a basically sound medical training which he kept up to date by voluminous reading. He apparently turned to full-time veterinary practice about 1847, although in his *Modern Horse Doctor* (1854) he states this is based on "his own experience, during a professional career of nine years in the vicinity of Boston." [24] Despite the opprobrious title, this was an excellent work, even by present-day standards,[25] and demonstrates that much of his experience had been gained since the publication of his *American Cattle Doctor* [26] in 1850. The latter work is sound from a medical standpoint, but his lack of familiarity with his principal subject is all too evident.

Dadd is truly a pivotal figure in the history of American veterinary medicine in more ways than one. In his early contributions to the agricultural press, he signed himself "G. H. Dadd, M. D." Later he added

[23] *Ibid.*: p. 155.

[24] G. H. Dadd: *The Modern Horse Doctor*. Boston: J. P. Jewett & Co., 1854, p. 5.

[25] An edition published (with little revision) in 1920 compares favorably with other popular works on diseases of the horse at this time.

[26] G. H. Dadd: *The American Reformed Cattle Doctor*. Boston: J. G. Tilton & Co., 1851.

"V. S.," [27] and still later he dropped the "M. D." or used it infrequently. Many other men of all sorts also became veterinary practitioners by the simple expedient of adding the "V. S." to their names; their writings, however, clearly demonstrate which were qualified for their newly adopted profession. Despite his having no formal veterinary training, Dadd's background was in many respects superior to that of many graduate veterinarians from Europe. Considering that he did not become well established as a veterinary practitioner until about 1850, he had a professional life of less than 20 years, dying "in harness" in 1868,[28] but in this time he achieved a notable number of "firsts" in the budding American veterinary profession.

He was the first consistently outspoken advocate of humane and rational treatment of the diseases of domestic animals, although, observing that "confession is good for the soul,"

> We plead guilty to bleeding, blistering, calomelizing, narcotizing, antimonializing, a great number of patients of the human kind. We did it in our verdant days, because it was so scientific and popular . . . On the other hand, we are free from the charge of bleeding or poisoning domestic animals, and can say, with a clear conscience, that we have never drawn a drop of blood from a four-footed creature . . .[29]

Dadd's frankness in stating his own views helped alienate him from many of his contemporary veterinary practitioners, who continued to rely upon heavy bleeding, blistering, and purging for most conditions. Dadd, however, stuck to his guns, and even for "vertigo," for which bleeding was universally employed, he says:

> Bloodletting is generally resorted to for most diseases of the brain; with what success the reader may learn by consulting the text books. The practice, however, lacks the sanction of the new school and our own humble advocacy.[30]

In keeping with his plea for humane treatment, Dadd was the first [31]

[27] "Veterinary Surgeon." Despite the unfavorable connotation given this title by unscrupulous and uneducated men who appropriated it, about 3500 such degrees were awarded by private veterinary schools from 1870 to 1920.

[28] The date of Dadd's death has been veiled in obscurity. The Library of Congress lists his birth (1813), but not his death. Both B. W. Bierer (*American Veterinary History*, mimeo., Baltimore, 1940) and Merillat and Campbell, *op. cit.*, say the date is unknown; the latter credit Dadd with lecturing on temperance in Chicago in the 1880's, but this, obviously, was his son, G. H. Dadd, Jr. The *Prairie Farmer* for Sept. 5, 1868, reports his death as having occurred in Baltimore the preceding week.

[29] G. H. Dadd: *The American Reformed Cattle Doctor*, pp. 61-62.

[30] G. H. Dadd: *The Modern Horse Doctor*, p. 46.

[31] Charles T. Jackson, M. D., in 1853 reported having demonstrated the effects of

to advocate and use general anesthesia as a regular adjunct to veterinary practice in America. The first such operation on record was in 1852,[83] but it seems likely that Dadd had been using general anesthesia for some time before. He maintained a cordial relationship with the physicians of Boston after relinquishing human practice, and he mentions having a physician serve as his anesthetist on several occasions. His proximity to the Massachusetts General Hospital, which he mentions a number of times, undoubtedly accounts for his early familiarity with the practice. For all painful operations, he says:

> We recommend that . . . . the subject be etherized, not only in view of preventing pain, but that we may, in the absence of all struggling on the part of our patient, perform the operation satisfactorily, and in much less time after etherization has taken place than otherwise.[83]

In 1851, Dadd edited and published the nation's first[84] veterinary periodical, the *American Veterinary Journal*, which ran irregularly[85] until 1859, when it was discontinued because of "remissiveness on the part of subscribers." The fact is that there was no veterinary profession to support a journal, and Dadd undoubtedly published at a loss to himself. Among the contributors to his *Journal* were two physicians: Thomas W. Gordon of Ohio, and Ben. Munore of Kentucky.

Following this ill-fated venture, Dadd became the first regular veterinary columnist for the *American Stock Journal* (1860), and achieved prominence as the editor of the Veterinary Department of the *Prairie Farmer* (1862). In this position he established a high-water mark for veterinary journalism in the agricultural press to that time. His columns departed from the commonplace "What's the matter with my horse?" type of offering, and instead, much of his copy aimed to instruct farmers on animal health as well as disease. He also contributed to several other

ether and chloroform anesthesia on domestic animals in 1846, but there is no evidence of its veterinary application at this time. ("Etherization of Animals." Report of the Commissioner of Patents—Agriculture, 1853, p. 59.)

[83] Merillat and Campbell, *op. cit.*, vol. 1, p. 287.

[83] G. H. Dadd: *The Modern Horse Doctor*, p. 252. Dadd used a mixture of chloroform and ether on a large sponge. He states that the Massachusetts General Hospital had discontinued use of "the complicated and expensive breathing machines." (p. 253, note) Ether alone is an unsatisfactory general anesthetic for horses.

[84] In 1818 James Carver, a graduate of the London Veterinary College, published two issues of a *Farriers' Magazine* (Phila.), but this was more in the nature of a series of essays and a promotion piece for his practice.

[85] Sept. 1851—Oct. 1852; Oct. 1855—March 1859, the last three issues being identified as volume 4.

journals, either on request, or when some particular barbarism needed correction.

Earlier, Dadd had been the principal promotor of the Boston Veterinary Institute, which opened in 1855 and closed in 1858 for lack of students. A few—perhaps not more than a dozen—students were graduated from this institution, but this much is noteworthy as another cardinal event in American veterinary history: four men, reputed to be graduates of this school,[86] later became presidents of the United States Veterinary Medical Association. Associated with Dadd were D. D. Slade, M. D., and C. M. Wood, M. D., V. S., the former being President of the institution. Slade later lectured on the diseases of domestic animals at Harvard University.[87]

After the Institute closed, Dadd, with one professional assistant, operated the Boston Veterinary School as the first functional private veterinary school in America. Students had the privilege of attending lectures on physiological chemistry and pathology at the Harvard University Medical School. This venture folded a year later, but not before several students—apparently hold-overs from the defunct Institute—had graduated. Dadd also operated a Chicago Veterinary Institute during his tenure with the *Prairie Farmer*, but this was no more successful. It is all too apparent that public appreciation for veterinary science had not developed to the point where a successful school could be operated.

Dadd had some characteristics, including a weakness for promoting his own remedies, which alienated him from a large segment of the veterinary profession. The United States Veterinary Medical Association, established in 1863, and which became the American Veterinary Medical Association in 1898, ignored Dadd altogether. Whatever his shortcomings, it can truly be said that he, more than any other one individual, was responsible for instilling the spirit of medicine into veterinary medicine in America.

In his opening address at the Boston Veterinary Institute in 1856, Dr. D. D. Slade stated:

> It is difficult to understand . . . why we, as a people, have so long shown such apathy in regard to veterinary science . . . We ourselves have, however, now

[86] Merillat and Campbell, *op. cit.*, vol. 1, p. 139, state: "The list of graduates is unknown but four of them became president of the United States Veterinary Medical Association." It is apparent, however, that these must have been honorary degrees awarded to members of the faculty.

[87] "The Bussey Institution, a school of agriculture and horticulture in Harvard University." (*Country Gentleman*, 1875, *40*: 557).

awakened to a sense of the importance of a proper diffusion of a knowledge on this subject. . . . It is quite time to put veterinary medicine upon the basis which it so justly merits . . . I know of no field in our country which offers such an abundant harvest both for fame and pecuniary remuneration to the young man of enterprise and education, as the practice of veterinary medicine upon scientific principles.[38]

In 1856 James Bryan, M. D., Professor of Surgery in the Pennsylvania College of Medicine in Philadelphia, delivered a "Plea for the establishment of veterinary colleges in the United States," before the State Agricultural Society of Pennsylvania.[39] Bryan, along with a colleague, William Gibson, became associated with Robert Jennings, a former student at the medical college, in an attempt to form the Veterinary College of Philadelphia, but this was a conspicuous failure.[40]

The New York College of Veterinary Surgeons was established in 1857, largely through the efforts of John Busteed, M. D., V. S. This venture failed shortly, but in 1864 Busteed was successful in reorganizing the college. The faculty in 1868 is of some interest in that all eight members were physicians, four of them veterinarians as well.[41] By 1895 twelve veterinary schools listed a total of 42 staff members with the M. D. degree, including 13 with a veterinary degree also.[42] In a number of instances veterinarians obtained the M. D. degree primarily for its prestige value, but the cumulative effect of this practice was bound to be a broader out-

[38] D. D. Slade: Introductory lecture delivered on the occasion of the commencement of the Boston Veterinary Institute. *American Veterinary Journal*, 1856, *1*: 97-107.

[39] This is noted by Dadd in the *American Veterinary Journal*, 1856, *1*: 256. I have not seen the text of the address.

[40] Jennings matriculated at the medical college in 1846 and lectured on veterinary science to classes of students from the several medical schools of Philadelphia from 1846 to 1850. In 1850, with Bryan and Gibson, he raised a subscription of $40,000 to start the Veterinary College of Philadelphia, which was chartered in 1852, but no students could be obtained. Another futile attempt was made in 1857, but it remained a "paper" institution until 1870, when as the "Pennsylvania College of Veterinary Surgeons," it was sold to a Robert McClure, who turned it into a diploma mill. McClure was jailed for forging signatures on diplomas, one of which is in the Veterinary Medicine Historical Library at Michigan State University.

[41] As listed in an advertisement of the fourth session (*Country Gentleman*, 1868, *32*: 303), the faculty consisted of: L. D. Mason, M. D., (Physiology); T. D. Weisse, M. D., (Surgical Pathology); S. R. Percy, M. D., (Materia Medica); A. W. Stein, M. D., (Histology); J. Busteed, M. D., V. S., (President); A. Liautard, M. D., V. S., (Anatomy and Surgery); A. Large, M. D., V. S., (Medicine); and J. L. Robertson, M. D., V. S., (Anatomy). Of the latter four, only Busteed's primary degree was in medicine. He studied at Alfort to prepare himself for his veterinary duties.

[42] Merillat and Campbell, *op. cit.*, vol. 1, pp. 338-340.

look for practitioners, both professionally and socially. The same was true of a number of physicians on veterinary faculties who qualified for the veterinary degree.

In retrospect, it is apparent that, except for George Dadd, most of the medical men who made contributions to American veterinary medicine in the half century between 1820 and 1870 were fairly ordinary practitioners, few of whom are known or remembered today. In the aggregate, however, the work done by these dedicated men forms an important part of the struggle of the budding veterinary profession for its very existence. There were many others that also made similar contributions toward awakening an apathetic public to the value of veterinary medicine, but those mentioned are representative of this group. As organized veterinary medicine approaches its centennial year (1963), it becomes a pleasant duty to acknowledge the efforts of these otherwise practically unknown men.

SOME HOAXES IN THE MEDICAL LITERATURE *

SAUL JARCHO

The arrival of a letter of invitation from the chairman of our Program Committee, Miss Elizabeth H. Thomson, aroused doubts and raised difficulties. In search of guidance I turned to the King James Bible. The text fell open at Judges IV. 20. This part of Holy Writ presents the homicidal story of Sisera and Jael, the wife of Heber the Kenite. The line on which my finger rested reads as follows: ". . . and it shall be, when any man doth come and ènquire of thee, and say, Is there any man here? that thou shalt say, No." This seemed clear enough. But Miss Thomson's letter of invitation was so graciously worded that it could not be denied precedence over the Law and the Prophets.

It is an axiom of civilized life that the members and guests of a learned society who have just enjoyed a large dinner shall not have their post-prandial comfort troubled by a prolix oration, nor are they to be weighted down with metaphysical profundities. In compliance with this principle the address that you are about to hear will be brief.

As added evidence of the speaker's goodwill, there will be no mention of historiography, philosophy, sociology or economics, and nothing will be said about Florence Nightingale, Dorothea Lynde Dix, Ella Wheeler Wilcox, the ether controversy, antivivisectionism, or social insurance; and if Hippocrates is mentioned, this will be done in order to cast the mantle of antiquity and respectability upon the discussion.

The subject of this brief talk is, " Some Hoaxes in the Medical Literature."

It is not necessary at this time to seek the ultimate origins of the hoax. Anyone who reads Pliny must surmise that the credulous Roman had suffered imposture, and the same may have been true of Herodotus, if not Aelian.

In more recent periods the eighteenth century seems to have been especially productive of fraudulent and semi-fraudulent writings, as we know from Defoe's *Journal of the Plague Year*, Dean Swift's Bickerstaff papers, Macpherson's *Ossian*, and similar fabrications.

* Address presented at the dinner session of the thirty-second annual meeting of the American Asociation for the History of Medicine, Cleveland, May 22, 1959.

Coming to times still nearer to our own, we have the illustrious examples of William Henry Welch and Sir William Osler. Welch did not scruple to pretend that he suffered from aortic aneurysm, and on one occasion he went so far as to conceal a rubber bulb in his clothing in order to alarm Halsted.[1]

In one recorded instance Welch proved himself, conversely, well able to resist imposture. The occasion was a meeting of the Association of American Physicians at which Abraham Jacobi [2] in complete good faith presented the case of a young man whose temperature allegedly had reached 148°. Jacobi moreover supported his statements by citing additional "hot cases" from the literature. In the discussion Welch rejected Jacobi's report as incredible. In addition Welch told of another case of alleged hyperthermia—this one had been published in the *Journal of the American Medical Association* [3]—, in which a temperature reading of 171° F had been obtained. These were cases of psychopathic patients reported by credulous physicians. But Welch, willing as he was to play practical jokes in private life, showed that he himself was proof against the tricks of hysterical malingerers.

Although the jocular propensities of Sir William Osler are well known, it is a little astonishing to find that in the index to Harvey Cushing's *Life*, under *Osler, Sir William*, there is a subhead titled *practical jokes, pranks, etc.*, which is followed by no less than 36 references. Many of these have to do with Osler's pseudonymous double, whom he named Egerton Y. Davis. Osler published at least two articles under the name or initials of the imaginary Dr. Davis. One of these [4] is a letter to the editor of the journal called *Medical News*. This hoax purports to describe a case of vaginal spasm, with Rabelaisian or Chaucerian complications. Further details would be obviously inappropriate in the present context, although

[1] Flexner, S. and Flexner, J. T.: *William Henry Welch and the Heroic Age of American Medicine*. New York, Viking Press, 1941, p. 173.

[2] Jacobi, A.: Hyperthermy in man up to 148° F. (64.4° C.). *Trans. Assoc. Amer. Phys.*, 1895, *10*: 159-189. Discussion by W. H. Welch and others, pp. 189-191. *See also* Burket, W. C., editor: *Papers and Addresses by William Henry Welch*. Baltimore, Johns Hopkins Press, 1920, vol. 1, pp. 367-369.

[3] Galbraith, W. J.: A remarkable case. *J. A. M. A.*, 1891, *16*: 407-409. *See also* Summers, J. E., Jr.: Omaha's "Remarkable Case" of high temperature. *Omaha Clinic*, 1891, *4*: 115-118. *See also* Poe, C. T.: *ibid.*, 1891, *4*: 269-270.

[4] Davis, E. Y. (pseudonym of William Osler): Vaginismus. *Medical News*, 1884, *45*: 673. Not unexpectedly, this item is unlisted in Miss Minnie Blogg's *Bibliography of the Writings of Sir William Osler*. Revised edition. Baltimore, 1921, 96 pp. *See also* An uncommon form of vaginismus (an editorial), *Medical News*, 1884, *45*: 602-603.

a British writer [5] on the same subject makes the awkward remark that "false delicacy must not be allowed for one moment to prevent us looking this condition straight in the face. . . ."

At about this time a singularly elaborate hoax was perpetrated in *Appleton's Cyclopaedia of American Biography*.[6] This work is now known to contain at least eighty-four biographies of persons who never existed.[7] Included among the galaxy of false luminaries is a Frenchman named Nicolas Henrion, who is said to have become famous through his successful control of a cholera outbreak in Callao, Peru, in 1783. As we know from the authoritative August Hirsch,[8] cholera did not make its first appearance in South America until 1835 and did not occur in Peru before about 1868. Thus the non-existent Henrion was ahead of his time.

Among purely literary hoaxes, perhaps the best known is the work of H. L. Mencken.[9] According to Mencken, the first American bathtub was installed in Cincinnati in 1842, and the first bathtub in the White House was set up in 1851 at the request of President Millard Fillmore. The revolutionary new device is said to have aroused widespread objection and ridicule, much of which came from the medical profession.

Mencken's tall tale was widely believed and was widely reprinted in newspapers, magazines, and even in the medical literature, despite the fact that Mencken on at least two occasions publicly exposed his own hoax. Professor Curtis MacDougall, in his entertaining volume on hoaxes,[10] gives a six-page list of victims, which includes *inter alia* the name of Hans Zinsser.[11] To this honor roll I can add the names of Hugh Young [12] and Victor Heiser.[13] As recently as seven months ago an

[5] Champneys, F. H.: Notes of a clinical lecture on vaginismus. *Clinical Journal*, 1892-3, *1*: 42-44.

[6] Wilson, J. G. and Fiske, John: *Appleton's Cyclopaedia of American Biography*. New York, Appleton, 1887-1900. 7 vols.

[7] Winchell, Constance M.: *Guide to Reference Books*. Seventh edition. Chicago, American Library Association, 1951, p. 434. *See also* "84 Phonies." *Letters*, 1936, *3*(19): 1-2. Schindler, M. C.: *Fictitious biography*. *Am. Hist. Rev.*, 1937, *42*: 680-690. MacDougall, C. D.: *Hoaxes*. Second Edition. New York, Dover Publications, 1958, p. 227.

[8] Hirsch, A.: *Handbook of Geographical and Historical Pathology*. London, New Sydenham Society, 1882-1886, vol. 1, pp. 401, 421.

[9] Originally published under the title of "A neglected anniversary" in the *New York Evening Mail* of December 28, 1917. *See* Mc Hugh, R., editor: *The bathtub hoax . . . by H. L. Mencken*. New York, Knopf, 1958.

[10] MacDougall, C. D., *op. cit.*, pp. 304-309.

[11] Zinsser, H.: *Rats, Lice and History*. Boston, Little, Brown, 1935, p. 285.

[12] Young, Hugh: *A Surgeon's Autobiography*. New York, Harcourt, Brace, 1940, pp. 64-65.

[13] Heiser, Victor: *You're the Doctor*. New York, Norton, 1939, p. 228.

anthropologist, in an article designed to enlighten health workers, repeated the same legend. Mencken's evil deed has lived after him.

My own interest in hoaxes arose in the following way. Many years ago I belonged to a journal club in a large eastern city. At one of our meetings a member reported that in a certain well-known clinical journal he had come across an article which was so profound as to be utterly unintelligible. When the text was produced for inspection, the leader of the club surmised that the article might be a hoax. Without intending to prejudice the case, I present a few excerpts herewith:

> . . . the methods assuring the utmost efficacy in prevention and treatment of antigenic and non-antigenic diseases are ultimately disclosed by hemology, which includes hemo-lympho-plasmology and hemo-lympho-cytology; *i. e.*, the structure, functions and modes of production and storage of each non-cellular and cellular constituent of blood and lymph and knowledge of activities responsible for wholesome and unwholesome modes of distribution of blood and lymph . . .
>
> Antigenic influences, exerted from establishment of a fetal circulation until death, are the entrance into internal environment from tissue or from external environment (maternal circulation in fetus) or irritating cellular constituents and viruses (parasites) or non-cellular constituents (foreign proteins; *i. e.* parasitic and non-parasitic antigens) which are, despite filtration by vascular endothelium, lymph glands, lungs, liver, spleen, bone marrow and kidneys, rapidly disseminated in some measure throughout the body . . .

Whether or not this egregious text was *intended* to be unintelligible, it at least opened one's eyes to new vistas and new possibilities in the medical literature.

The subject of spurious medical writing came to attention again as recently as 1957 in the form of the Coudé hoax. For those who are not physicians I may be permitted to explain that a certain lack of straightforwardness in the structure of the human male has made it advantageous for urologists to employ an instrument which is slightly bent. From the French word *coude* (elbow), this bent device has come to be known as the *coudé* catheter.

In 1957 a journal named *The Leech*, which is published by the students' society of the Welsh National School of Medicine at Cardiff, printed the biography of one Dr. Emile Coudé (1800-1870), alleged inventor of the *coudé* catheter.[14] This biography was equipped with footnotes and was ornamented by an impressive photograph—all spurious.

At this time Sir Hamilton Bailey was preparing a new edition of his

[14] R. P.: Emile Coudé (1800-1870), *The Leech*, 1957, *4*(*6*): 15-16.

Short Practice of Surgery. As he later reported in letters to the *Lancet* and the *British Medical Journal*,[15] he did not detect the falsity of the *Coudé* biography until his text was in page proof. Consequently several pages of the new edition had to be reset and biographical references to Coudé deleted.

This incident caused a flurry of letters in the British medical press.[16] The *Lancet* carried the indignant complaint of one Hercule Coudé, who proclaimed that the honour of his illustrious granduncle Emile had been impeached.[17]

Not content with introducing the non-existent Dr. Emile Coudé, the editors of *The Leech* later published a learned essay by one S. N. Gaño[18] titled "A gloss attributed to the Hippocratic school." This article purports to be the first presentation in English of a short text which somehow had been neglected by previous scholars such as Littré, Adams, Withington, and Jones and had been "probably prepared by a student or member of the Hippocratic group." Dr. Gaño goes on to remark that "the stylistic traits bear strong evidence of genuineness, and the reader cannot fail to be impressed by the conciseness, clarity, and sagacity which are displayed in almost every paragraph."

Here are a few excerpts from Dr. Gaño's "Hippocratic" text:

1. Absence of respiration is a bad sign.
2. It is unfavourable for the patient to be purple, especially if he is also cold. The physician should not promise a cure in such cases.
11. Patients who always wake up on the wrong side should be treated by purges.
15. Fevers of eighty days where no cause is apparent produce alienation of the mind in the physician.
22. Life is short and the art long; patients are inscrutable, their ignorance is impenetrable, and their relatives are impossible.
23. When swarthy parents have a blonde child and a blonde serving-maid, the physician should suspect a displacement of the humors. I hold that this condition is no more divine than any other.
29. Great delay in resolution of the humors is more common among the rich than among the poor . . .

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[15] Bailey, H., Bishop, W. J., and Morson, A. C.: Coudé straightened out. *Lancet*, 1958, *2*: 424, and *Brit. M. J.*, 1958, *2*: 513.

[16] See *Lancet*, 1958, *2*: 522, 526; *Brit. M. J.*, 1958, *2*: 567, 640, 693. My thanks are offered to Mrs. Elizabeth Bready of the New York Academy of Medicine for these entertaining items.

[17] *Lancet*, 1958, *2*: 456.

[18] Gaño, S. N.: A gloss attributed to the Hippocratic school. *Leech*, 1958, *4*(8): 17-19.

The editor of *The Leech* in a brief introductory note states that S. N. Gaño is the pseudonym of a New York physician. Since I know of no New York physician who is conspicuously (or even slightly) interested in Hippocrates, I cannot guess who S. N. Gaño might be. If he is a student of the history of medicine, he is probably a member of this Association. If such is the case, perhaps he is somewhere in this room at this moment. Certainly his fellow-members have the right to expect that he will come forth and disclose his identity to them.

AMERICAN ASSOCIATION FOR THE HISTORY OF MEDICINE

REPORT OF THE

THIRTY-SECOND ANNUAL MEETING

CLEVELAND, OHIO

MAY 21, 22, AND 23, 1959

The Thirty-Second Annual Meeting of the American Association for the History of Medicine was held in Cleveland, Ohio, May 21-23, 1959, upon the invitation of the Cleveland Medical Library Association, the Cleveland Health Museum, the Handerson Medical History Society, and the Ohio Academy of Medical History. Altogether more than a hundred members and guests attended an excellent program of papers, all of which were presented at the Cleveland Medical Library, and enjoyed as well the opportunity to visit the Health Museum, the Howard Dittrick Museum of Historical Medicine, and the History of Medicine Division of the National Library of Medicine. Members of the Association attending the meeting were also very graciously invited to attend the Baldwin-Wallace College Bach Festival at Berea on Saturday afternoon and evening. To all those who made possible this fine meeting the Association is much indebted.

PROGRAM

THURSDAY, MAY 21, 1959

Morning

9:00–12:00 Registration
Council Meeting

Afternoon

12:30 Luncheon for Council, Cleveland Clinic Hospital

2:00– 4:00 General Session

Alexander T. Bunts, Presiding

Welcoming Remarks

William P. Garver, President, Cleveland Medical Library Association

1. Social, Intellectual, and Scientific Aspects of the History of Vaccination in England toward the End of the Nineteenth Century
   Ann Beck, Madison, S. D.
2. The Parish Doctor: England's Poor Law Medical Officer, 1870-1900
   Jeanne L. Brand, Bethesda, Md.

3. The Struggle between Cellular Pathology and Neural Pathology in the Nineteenth Century
   Gernot Rath, Bonn, Germany
4. The Development of Knowledge of Kidney Function in Relation to Structure—Malpighi to Bowman
   Leonard G. Wilson, Berkeley, Cal.
5. Surgical Pathology in the Renaissance
   Leo M. Zimmerman, Chicago, Ill.

Discussion

4:30 Tea, Cleveland Health Museum

Evening

8:00–10:00 Open House

Hosts: National Library of Medicine
Harriet C. Jameson, Chief, History of Medicine Division

Cleveland Medical Library
William P. Garver, President

Howard Dittrick Museum of Historical Medicine
Henry H. Fertig, Director

FRIDAY, MAY 22, 1959

Morning

9:30–12:15 Symposium on the Heart

Chauncey D. Leake, Presiding

1. Significant Advances in Cardiac Physiology during the Nineteenth Century
   Carl J. Wiggers, Cleveland, Ohio
2. The Historical Development of Methods for Diagnosing Heart Disease
   Victor A. McKusick, Baltimore, Md.
3. The History of the Medical Treatment of Heart Disease
   Harold Feil, Cleveland, Ohio
4. The History of the Surgical Treatment of Heart Disease
   George H. A. Clowes, Jr., Cleveland, Ohio

Discussion

Afternoon

2:15– 3:30 General Session

Torald H. Sollmann, Presiding

1. The Inception of Anatomical Studies in the University of Paris
   C. D. O'Malley, Stanford University, Cal.

2. Auscultation in England, 1821-1837
   Lester S. King, Chicago, Ill.
3. Social Class and Psychological Medicine in the United States (1789-1824)
   Norman Dain, New York, N. Y.

Discussion

3:45– 4:45 Garrison Lecture

Owsei Temkin, Presiding

A View of Nineteenth Century Medical Historiography in the U. S. A.
Walton B. McDaniel, 2d, Philadelphia, Pa.

Evening

6:00 Cocktail Party, Cleveland Medical Library Association, Host

7:30 Annual Dinner

Owsei Temkin, Presiding

Announcement of Awards

Address: Hoaxes in Medical Literature
Saul Jarcho, New York, N. Y.

SATURDAY, MAY 23, 1959

Morning

9:00–10:15 Business Meeting

10:30–12:00 Round Table Commemorating the Centenary of Charles Darwin's *Origin of Species*

Moderator: *Bruno Gebhard*, Director, Cleveland Health Museum

Participants: Faculty Members, Western Reserve University
Isaac Levi, Assistant Professor of Philosophy
Thomas Munro, Professor of Art
Horace Abram Rigg, Jr., Severance Professor of the History of Religion
Robert M. Stecher, Associate Clinical Professor of Medicine
Arthur G. Steinberg, Professor of Biology and Assistant Professor of Human Genetics

Afternoon

1:30 Departure for Baldwin-Wallace College Bach Festival, Berea, Ohio

Program Committee

Elizabeth H. Thomson, *Chairman*

Chauncey D. Leake Genevieve Miller

Local Arrangements Committee

Bruno Gebhard, *Chairman*

Genevieve Miller, *Secretary*
Paul E. Boyle
Alexander T. Bunts
Meredith B. Colket
Arthur C. Corcoran
Harold Feil
Henry H. Fertig
Harriet C. Jameson
Melvin Kranzberg
Sherman E. Lee
A. Benedict Schneider
Torald H. Sollmann
Robert M. Stecher
Gary J. Tucker
Walter F. Vella
Carl F. Wittke

BUSINESS MEETING[1]

The annual business meeting was called to order by the President, Dr. Owsei Temkin, at 9:15 a. m., May 23, 1959. The President read the names of members who had died since the last meeting and asked those present to rise in their memory:

Ernest Irons
Elise Strang L'Esperance
Harry V. Paryzek
David A. Tucker, Jr.

The Secretary then presented the report of the Council. He stated that the Council had voted to accept the report of the Welch Medal Committee that no award be made this year. The Council also voted to accept the report of the Osler Medal Committee and award the medal accordingly.

Report of the William Osler Medal Committee

Following the usual practice, the chairman of the Osler Medal Committee circularized the different medical schools of the United States and Canada, as well as various journals, in order to publicize the conditions of the contest for the Osler Medal. Nine essays have been received: three from students of the University of Chicago; one, each, respectively from Howard University, the College of Physicians and Surgeons of New York City at Columbia University, Baylor University, Marquette University, the University of Rochester, and the State University of New York School of Medicine at Brooklyn.

One essay had already been published in part in an ephemeral school news sheet so that the committee, interpreting the rules strictly, was regretfully forced to return it to the essayist without further consideration.

The committee recommends that the Osler Medal in 1959 be awarded to Mr. Richard L. Grant, 5707 S. Kenward Avenue, Chicago, Ill., who is a senior medical student at the University of Chicago School of Medicine, for his essay entitled "Antyllus, His Works and the Medicine of His Day."

[1] The following abstract of the minutes of the Business Meeting is presented for the information of the Members. The complete official minutes are preserved in the Secretary's office, where they are open to inspection upon the request of any Member.

The committee also recommends that a certificate of honorable mention with a year's subscription to the *Bulletin of the History of Medicine* be awarded to Miss Daryl E. Beckman, 125 Kennedy Lane, Bryn Mawr, Pa., class of 1961, College of Physicians and Surgeons of New York, for her essay entitled "Hippocratic Dietetics," and to Miss Jane F. Pascale, 1010 E. 59th Street, Chicago, Ill., class of 1959, University of Chicago, for her essay entitled "The Dancing Mania: a Revaluation in the Light of 20th Century Knowledge."

LEO M. ZIMMERMAN,
WALTON B. MCDANIEL, 2D,
SAMUEL X. RADBILL, *Chairman*

The Secretary also presented the Financial Report of the Council and stated that the Council had voted to meet in Charleston, South Carolina, in 1960, and in Chicago, Illinois, in 1961.

Following the report of the Auditors, the Financial Report was approved and is here presented in abstract.

FINANCIAL REPORT ON THE FISCAL YEAR 1957/58

Ending 31 October 1958

CLASSIFIED STATEMENT OF RECEIPTS AND EXPENDITURES

1 November 1957—31 October 1958

GENERAL OPERATING FUND

RECEIPTS:		
Balance on hand, 1 November 1957		$ 548.17
Membership dues		3,465.15
Miscellaneous		20.33
		$4,033.65
EXPENDITURES:		
Subscriptions to Bulletin		$2,810.16
Office expenses		269.53
Honors and Awards:		
Osler Medal	$ 83.57	
Welch Medal	27.75	
Garrison Lecture	100.00	
		211.32
Bibliography of History of Medicine		52.77
Legal fees		500.00
		$3,843.78
Balance on hand, 31 October 1958		189.87
		$4,033.65

President's Discretionary Fund

Receipts:		
Balance, 1 November 1957		$ 297.12
Expenditures:		
Incorporation Expenses		$ 86.66
Balance		210.46
		$ 297.12

Annual Meeting Fund

Receipts:		
Gifts:		
E. R. Squibb & Sons	$1,000.00	
Chas. Pfizer & Co.	1,000.00	
Merck & Co., Inc.	1,000.00	
		$3,000.00
Annual Dinner, etc.		347.50
		$3,347.50
Expenditures:		
Secretarial, printing, postage & telephone		$ 538.45
Dinners, Refreshment, and Service		1,339.31
Transportation		9.60
		$1,887.36
Balance, 31 October 1958		1,460.14
		$3,347.50

Statement of Balance

31 October 1957

Assets:		
Cash on hand		$ 845.29
Accounts receivable		6.00
		$ 851.29
Liabilities:		
Accounts payable	$ 0.00	
Dues prepaid	28.00	
		$ 28.00
Net Worth:		
President's Discretionary Fund	$297.12	
Donated surplus	526.17	
		823.29
		$ 851.29

31 October 1958

ASSETS:		
Cash on hand		$1,860.47
Accounts receivable		18.00
		$1,878.47
LIABILITIES:		
Accounts payable	$ 16.00	
Dues prepaid	24.00	
		$ 40.00
NET WORTH:		
President's Discretionary Fund	$ 210.46	
Annual Meeting Fund	1,460.14	
Donated Surplus	167.87	
		1,838.47
		$1,878.47

The Secretary further reported that the number of members at the beginning and end of the fiscal year were:

	Nov. 1, 1957	Oct. 31, 1958	Net change
Constituent Societies	26	25	(1)
Honorary Members	7	7	0
Active Members	505	505	0
Nonresident Members	17	18	1

The Secretary then presented the following financial statement from The Johns Hopkins University relative to the *Bulletin of the History of Medicine*.

RECEIPTS AND DISBURSEMENTS

FOR YEAR 1958

RECEIPTS:		
Subscriptions—Members A. A. H. M.	$2,827.13	
Subscriptions—to The Johns Hopkins Press	2,745.23	
Single Issues	562.85	
Reprints	353.19	
Advertising	30.25	
Miscellaneous Income (Index)	1.35	
		$6,520.00
DISBURSEMENTS:		
Printing Issue # 1	$ 964.77	
Printing Issue # 2	850.53	

Printing Issue # 3	970.42	
Printing Issue # 4	1,051.71	
Printing Issue # 5	1,034.35	
Printing Issue # 6	1,189.46	
Additional Reprints	355.65	
Commission to Press	2,352.00	
Commission to Sales Agents	1.73	
Assistant Editor	3,000.00	
		$11,770.62
FUNDS EXPENDED BY THE JOHNS HOPKINS UNIVERSITY		$ 5,250.62

The following persons, proposed by the Nominating Committee, were then unanimously elected:

For Secretary and Treasurer: (to hold office for 2 years)	John B. Blake
For Members of the Council: (4 to be elected to hold office for 3 years)	Saul Jarcho Esmond R. Long Genevieve Miller J. I. Waring

Upon the nomination of the Council, the members then unanimously elected Dr. Erwin H. Ackerknecht an Honorary Member of the Association.

The Secretary received from the Constituent Societies the following reports for 1958-59.

Alabama Society of Medical History

Officers: President: Dr. E. B. Glenn; Vice-President: Dr. Victor Spira; Secretary-Treasurer: Mrs. Geraldine Emerson; Editors of *De Historia Medicinae*: Dr. Ben C. Moffett, Dr. John J. Sharry.

An Executive Committee was set up to handle the business affairs of the Society. This Committee was composed of the officers of the Society and two additional members from the Society, Mrs. Sarah C. Brown and Dr. E. B. Carmichael. Meetings of the Executive Committee are held in the Lawrence Reynolds Historical Library which is a part of the University of Alabama Medical Center Library.

To date three program meetings have been held. These are night meetings held at the University of Alabama Medical Center.

October 23, 1958: Dr. Ben V. Branscomb, Assistant Professor of Internal Medicine, University of Alabama Medical Center, "Pioneer Experiments in Space Medicine."

December 18, 1958: Dr. William Pratt Dale, II, Professor of History, Howard College, "Certain Aspects of Peruvian Medicine in the Eighteenth Century."

March 5, 1959: Dr. Cecil E. Abernethy, Professor of English, Birmingham-Southern College, "Samuel Pepys—Lively Invalid."

The last program meeting for the current year is scheduled for May 7, 1959, at which time Dr. E. B. Robinson, Jr., Director of the Lloyd Noland Hospital, Fairfield, Alabama, will speak on "Lloyd Noland and the Tennessee Company."

Attendance at the three meetings averaged 55, including both members and guests.

Volume III, *De Historia Medicinae,* was published during the current year. Formerly this publication was mimeographed but starting with Volume III, Number 1, *De Historia Medicinae*, a commercially printed, 6 inch x 9 inch, 16-20 page journal has supplanted the mimeographed one. A subscription fee of $2.00 per volume is charged. The Society furnishes the journal to its membership as part of their dues. Fourteen libraries to date have subscribed to the journal, and there are fifteen complimentary or exchange subscriptions. One thousand copies of Volume III, Number 1, *De Historia Medicinae* were circulated for publicity for the journal. Circulation of Numbers 2 and 3 of Volume III is approximately 125. It is anticipated that circulation will increase to approximately 200 during the next year.

There are 92 members of the Alabama Society of Medical History, including six honorary members and eight student members.

Each Monday night during the month of April the Alabama Society of Medical History has been invited by the University of Alabama Medical Center to present a half-hour program over the Alabama Educational Television Network, originating on Channel 10 in Birmingham. The programs are scheduled as follows:

April 6, 1959, Mrs. Mildred Whatley, "The Lecture Notes of William McCants, Medical Student, 1856." Also participating, Dr. E. B. Glenn.

April 13, 1959: Dr. Buford Word, "From Eve to Eternity: High-lights in Gynecology."

April 20, 1959: Dr. William Buck, "Medical History of the Civil War." Also participating, Dr. John J. Sharry.

April 27, 1959: Miss Martha Jo Jackson, "Charles Darwin and Evolution." Also participating, Dr. Carl Sensenig and Dr. Ben C. Moffett.

GERALDINE EMERSON, *Secretary-Treasurer*

American Academy of the History of Dentistry

At the annual meeting of the Academy of the History of Dentistry, November 7, 1958, at Dallas, Texas, a program of historical papers relative to dentistry in the United States was presented. A new constitution and new bylaws were adopted at the business meeting. As a result of the activity of the membership committee, an unusual number of new members were admitted at this meeting. The Academy, through committees, has been working on three projects to forward memorial exhibits related to dental history. These projects are: developing the dental historical collection and exhibition of the Smithsonian Institution; planning and creating an historical exhibit for the Centennial celebration of the founding of the American Dental Association, to be held in New York, September 14-18, 1959;

and establishing as a permanent memorial the birthplace of Horace Wells, discoverer of nitrous-oxide anesthesia. The *Bulletin of the History of Dentistry* has been continued throughout the year.

JAMES M. COURTNEY, *Delegate*

American Institute of the History of Pharmacy

The Proceedings of the annual meeting of 1958 have been published in *Pharmacy in History*, 1959, *4*, no. 1.

Benjamin Waterhouse Medical History Society

The Twenty-Seventh and final meeting of the Benjamin Waterhouse Medical History Society for the 1958-59 season was held at the Massachusetts Memorial Hospital on April 13, 1959.

The Nominating Committee brought in a new slate of officers which were voted in as follows: President: Dr. George F. Miller; Honorary Vice President: Dr. Jean A. Curran; Vice Presidents: Fred A. Rundlett (B. U. Class '60), Kenneth Morley (B. U. Class '60); Secretary Treasurer: Dr. John J. Byrne.

A summary of the Society's activities for the year consists of the following programs:

October 20, 1958: Dr. John J. Byrne, Professor of Surgery, Boston University School of Medicine, and Director of the Third (B. U.) Surgical Service and Research Laboratory, Boston City Hospital, "Medicine at Plymouth Plantation" (published in the *New England Journal of Medicine*, 1958, *259*: 1012-1017)

November 17, 1958: Dr. Carl W. Walter, Associate Clinical Professor of Surgery at Harvard Medical School and Surgeon at the Peter Bent Brigham Hospital, "Asepsis in the 19th Century"

January 5, 1959: Dr. Donald Fleming, Visiting Professor of History, Harvard University, and Professor of the History of Science, Yale University, "Inoculation Controversy of 1721"

February 9, 1959: George Thornton and Arnold Wong (B. U. Class 1959), Vice Presidents of the Society, "Podagra—History and Martyrs"

March 16, 1959: The Society met with the Providence Medical History Society. Dr. Seebert Goldowsky, Director, Peripheral Vascular Clinic, Rhode Island Hospital, spoke on "The Hospital at Portsmouth Grove"

April 13, 1959: Dr. Lamar Soutter, Associate Professor of Surgery, Boston University School of Medicine, Visiting Surgeon at the Massachusetts Memorial Hospital, and President of the Society, "Medicine in the Arctic"

The Society plans to resume its activities in October of 1959 with an excellent program to insure another successful season.

JOHN J. BYRNE, *Secretary*

Billings Society of Medical History

Our society had its inception in the summer of 1958 when a group of medical

students who were interested in medical history decided that a history of medicine society should be established at the University of Chicago to help increase interest in the subject. With the help of Dr. Ilza Veith and Dr. Richard K. Blaisdell, and enthusiastic support from students and faculty, the Billings Society of Medical History was founded.

Our program for the first year included weekly seminars conducted by Dr. Veith and bi-monthly lectures presented by members of the faculty and visiting professors.

During the year several members of the Society presented papers at meetings of The Chicago History of Medicine Society. Billings Society members, Dr. Richard Grant and Dr. Jane Pascale, were awarded 1st prize and honorable mention respectively in the Osler Contest for papers entitled: "Antyllus, His Works and the Medicine of His Day," and "The Dancing Mania, a Revaluation in the Light of 20th Century Knowledge."

JAMES L. BENNINGTON, *Secretary-Treasurer*

College of Physicians of Philadelphia, Section on Medical History

The Section on Medical History of the College of Physicians of Philadelphia presented a varied program during the past year. The President of the College, Dr. Jonathan E. Rhoads, appointed the following Fellows to serve on the Executive Committee of the Section, which has 126 members: Drs. Herbert T. Kelly, Samuel X. Radbill, Nicholas Padis; the Chairman, Dr. Fred B. Rogers, and the Clerk, Dr. Herbert J. Dietrich, Jr. Dr. Rogers represented the Section at the Annual Meeting of the American Association for the History of Medicine at Cleveland, Ohio, on May 21-23, 1959.

Four meetings were held by the Section in 1958, and three to May in 1959. Continuing the series of five programs arranged by the medical schools of Philadelphia, the Woman's Medical College presented the following program on January 21, 1958: Dr. Catharine Macfarlane reviewed "The Medical Societies and Women Physicians," Dr. Alma Dea Morani discussed "The Evolution of Plastic Surgery," and Drs. Elsa Kertesz and Janet Parker spoke on "Immunization—Eighteenth versus Twentieth Century." The papers by Drs. Macfarlane and Morani appeared in the *Transactions & Studies of the College of Physicians of Philadelphia* in August 1958, and that by Drs. Parker and Kertesz in *Philadelphia Medicine* for January 2 and 9, 1959.

Jefferson Medical College sponsored its First Annual Osler Lecture of the Osler Medical History Club in conjunction with the Section on Medical History of the College of Physicians of Philadelphia, on March 11, 1958. Dr. A. Earl Walker of the Johns Hopkins Hospital spoke on "Primitive Trepanation: the Beginning of Medical History." This paper was published in the *Transactions & Studies* of August 1958.

On April 15, 1958, Professor Eleanor M. Tilton, Department of English, Barnard College, New York, gave the Tenth Annual Kate Hurd Mead Class of 1888 Lecture in Medical History of the Woman's Medical College of Pennsylvania, in conjunction with the Section on Medical History. The topic was, "Science and Sentiment: a Study of Oliver Wendell Holmes." This lecture was printed in the August issue of *Transactions & Studies*.

Hahnemann Medical College arranged the program for a meeting on October 21, 1958. Dean Charles S. Cameron spoke on "Homeopathy in Retrospect" (to be published in *Transactions & Studies*, July 1959), and Mr. Dean Arvan, medical student at Hahnemann, discussed "Philadelphia Doctors in the White House." On the same evening the Section's Second Annual Edward Bell Krumbhaar Award in Medical History was presented to Dr. Donald E. Willard, Jr., 1958 graduate of Jefferson Medical College interning at the New York Hospital, for his essay on "W. W. Keen's 'First Modern Brain Case'." The prize, a certificate and $100 cash award, was presented to Dr. Willard for the Section by Dr. Krumbhaar. The prize essay and a report on the award appeared in the *Transactions & Studies* of February 1959.

On February 17, 1959, the Section's program included: "A Mock-Epic Poem, 'La Guerre des Vénètes,' by R. T. H. Laennec," read by Dr. William P. Boger; "The Story of Herbs in Medicine," by Dr. Douglas Macfarlan; "Dr. Robley Dunglison, Jefferson and Jefferson Medical College," by Dr. Samuel X. Radbill; "Mark Akenside, Eighteenth Century Physician-Poet," by Dr. Herbert J. Dietrich, Jr. The papers of Drs. Boger and Radbill will appear in the July issue of *Transactions & Studies.*

Dr. David M. Davis, Emeritus Professor of Urology, Jefferson Medical College, presented the Second Annual Osler Lecture of Jefferson Medical College, in conjunction with the Section on Medical History, on March 3, 1959. Dr. Davis reviewed "The Residency System in Medical Education." This lecture will be published in the *Transactions & Studies* for October 1959.

The Eleventh Annual Kate Hurd Mead Lecture, sponsored with the Woman's Medical College, was delivered by Professor Herbert F. West, Chairman of the Department of Comparative Literature, Dartmouth College, on April 7, 1959. His subject was "Rabelais, Sterne and Osler: Companions in Wit." This lecture will appear in the October 1959 issue of *Transactions & Studies.*

In January 1959, Dr. Padis, Past Chairman of the Section, presented a cheque for $316 to Dr. W. B. McDaniel, 2d, Curator of Historical Collections of the Library of the College of Physicians, for the purchase of items needed to enrich the Library's holdings in medical history. This cheque, representing two dollars from each five dollars dues of members, initiated an annual contribution by the Section to assist the Curator's valuable work at the College. The Section is also grateful to Dr. McDaniel for interesting exhibits arranged in the Library at the time of each Section meeting.

Dr. Herbert J. Dietrich, Jr., was recently elected Chairman of the Section, succeeding Dr. Rogers, who replaced Dr. Kelly on the Executive Committee, and Dr. Robert J. Gill of the Pennsylvania Hospital was named Clerk for 1959-1960.

FRED B. ROGERS, *Delegate*

Frederick R. Taylor History of Medicine Society

Our activities for the past year have been as follows:

December 16, 1958: Dr. Blaine Nashold, Associate Professor of Neurosurgery at Duke University, presented a paper and slides on Baron Larrey, physician to Napoleon.

April 6, 1959: Dean Wilburt C. Davison of Duke University talked of his experiences as a student under Sir William Osler.

May 14, 1959: Five medical students presented papers they had written in conjunction with their course in History of Medicine.

As part of our activities for the following year, we would like to set up displays of interesting objects of historical note in our medical school library. We would appreciate any information as to sources we might use for these displays.

BEE GATLING, *Secretary-Treasurer*

Handerson Medical History Society

The Handerson Medical History Society has met four times since the last annual meeting, under the presidency of Dr. Torald Sollmann. The president for the next two years will be Dr. Harold Feil.

The programs were as follows:

October 22, 1958: Mr. Meredith B. Colket, "Medical Practice in the Early Days of the Western Reserve"

Dr. Genevieve Miller, "The Sassafras Tree"

November 24, 1958: Dr. J. Dudfield Rose, "Dr. Harlequin"

March 25, 1959: Dr. Albert M. Potts, "The Mind's Eye, Concepts of Vision in the Primitive and Ancient World"

April 22, 1959: Dr. C. Wesley Dupertuis, "The History of Ideas about Constitutional Types"

Together with the Cleveland Medical Library Association, the Cleveland Health Museum, and the Ohio Academy of Medical History, the Handerson Society was an inviting organization for the 32nd Annual Meeting of the A. A. H. M. in Cleveland, May 21-23.

GENEVIEVE MILLER, *Secretary-Treasurer*

The Johns Hopkins Institute of the History of Medicine

A report of the activities of the Institute during the academic year 1958-59 will be published elsewhere in the *Bulletin*.

The Johns Hopkins Medical History Club

During the academic year 1958-59 the Club held five meetings, all of which have been announced in this *Bulletin* (1958, *32*: 573; 1959, *33*: 83, 182, and 277). Officers during that year were: Curt P. Richter, president; Mark M. Ravitch, vice president; Owsei Temkin, secretary; Sanford V. Larkey, delegate to the American Association for the History of Medicine. For the academic year 1959-60, the following officers have been elected: Mark M. Ravitch, president; Palmer H. Futcher, vice president; Owsei Temkin, secretary; Sanford V. Larkey, delegate.

SANFORD V. LARKEY, *Delegate*

Josiah C. Trent Society for the History of Medicine

The Josiah C. Trent Society for the History of Medicine recently resumed its activities. Plans were made for monthly meetings in which a member of the Society would read an original paper. An informal general discussion would follow the presentation.

The officers for this year are Dr. Irwin Brody, Mr. Gail Williams, and Miss Eleanor Flanagan. The faculty adviser is Dr. E. Croft Long.

At the first meeting on April 2, 1958, Dr. Irwin Brody spoke on "William Osler's Attitude toward Medical Treatments."

Mr. Fred Erisman gave a talk at the second meeting on May 28, 1959, on "The History of Gray's *Anatomy*."

The annual lectureship will continue and a guest speaker will be invited this fall.

IRWIN BRODY

Ohio Academy of Medical History

The last meeting of the Ohio Academy of Medical History was held on April 26, 1958, at the Taft Museum in Cincinnati. Dr. Chauncey Leake was elected President and Linden F. Edwards Secretary-Treasurer. It was planned to hold the 1959 annual meeting of the Academy at the time of the annual meeting of the Ohio State Medical Association in Columbus during the week of April 22. However, it was impossible to make such an arrangement because of conflicts with a series of special meetings celebrating the 125th anniversary of the Ohio State University College of Medicine.

Of special interest in connection with the celebration was the gift to the Health Center Library of a valuable collection of Vesaliana by Dr. Alfred H. Whittaker, a distinguished alumnus and loyal member of the American Association for the History of Medicine. Included in the collection is a 1555 edition of the *Fabrica*.

Since the 1958 meeting at Cincinnati the Academy has suffered the loss by death of two of its faithful and distinguished members, Dr. David A. Tucker, Jr., who passed away June 2, 1958, and Dr. Clyde L. Cummer, whose death occurred June 8, 1958. Dr. Tucker, although obviously suffering physical pain at the time, appeared on the program at Cincinnati and had arranged an exhibit of some of the items in his superb collection of the history of medicine, which he presented to the University of Cincinnati Medical College Library. A well edited, printed, indexed, and informative bibliography of the collection has been prepared by Joan Titley, Librarian.

A project being sponsored by the Academy in cooperation with a committee of the Ohio State Medical Association is the collection of information and data bearing upon the history of medicine in Ohio, starting at the county level. The Academy is also cooperating with the Ohio State University Health Center Library in establishing a Medical Ohioana Library collection.

Membership of the Academy at present numbers 61, including four honorary life members. The vast majority of members of the Academy are also joint mem-

bers of the Ohio Historical Society, with which an arrangement is made whereby the members receive a subscription to the monthly *Museum Echoes* and *Quarterly Bulletin* of that Society, as well as other benefits.

At a business meeting of the Academy held in Cleveland May 22, 1959, the following panel of officers was elected for the coming year: President: Dr. Genevieve Miller; Secretary-Treasurer: Linden F. Edwards.

LINDEN F. EDWARDS, *Secretary-Treasurer*

Providence Medical Historical Society

During the past year the Providence Medical Historical Society has had three meetings as is our custom. They have been well attended and well received. One of our meetings was held in conjunction with the Benjamin Waterhouse Medical History Society in Boston and was extremely successful. It is anticipated that in future years we will have further joint meetings, probably alternating the site of the meeting in Providence and Boston.

ELIHU S. WING, JR.

Richmond Academy of Medicine, Section on the History of Medicine

The twenty-fourth annual meeting of the Section on the History of Medicine was held February 10, 1959. Approximately 160 members and guests were present. A number of books and other gifts to the Academy were received.

Dr. Harvey B. Haag spoke on "Charles Édouard Brown-Séquard—His Richmond Sojourn." Dr. John C. Krantz, Jr., Professor of Pharmacology, University of Maryland School of Medicine, presented the first Walter Reed Memorial Lecture. His subject was "Implications of the Medical History of General Lee." Both papers have been published in the *Virginia Medical Monthly*, June, 1959.

WILLIAM C. HIGGINS, JR., *Acting Secretary*

Robert Wilson Medical History Club of Charleston, South Carolina

The Robert Wilson Medical History Club has continued to meet in the usual fashion in the homes of its various members. The membership remains in the neighborhood of twenty, and the Club has invited a number of guests to the several meetings. It is planned to continue the arrangement of having five meetings a year and to pursue the same general arrangements.

The program presented during the current year was as follows:

October: Robert Wilson, "The Doctors Wilson of Charleston"
December: Dr. R. W. Hanckel, "Deafness: An Historical Sketch"
January: Dr. Cheves Smythe, "Phrenology"
March: Dr. Forde McIver, "Tombstone Territory (The Local Churchyards)"
May: Dr. S. Edward Izard, "Dr. Francis Kinloch Huger"

J. I. WARING, *Secretary*

Society for the History of Medical Science, Los Angeles

The Society for the History of Medical Science held the first two meetings of the year in November, 1958, when Dr. C. Donald O'Malley of Stanford University spoke on "The Medical Faculty of the University of Paris during the Renaissance," and Dr. Kenneth D. Keele of the Ashford and Staines Hospitals in Middlesex, England, spoke on "Exploring the Paths of Pain." The 1959 program centered on the centennial of *The Origin of Species*, with Dr. Alice Carleton of Oxford University speaking in January on "Missing Links: the Piltdown Man and Other Hoaxes in the History of Biology"; Dr. William Irvine of Stanford University, in March, on "The Influence of Darwin on English Literature"; and, in May, Dr. Robert I. Bowman of San Francisco State College on "Darwin and the Galapagos: Origins of *The Origin of Species*."

With the U. C. L. A. Department of Zoology, the Society also sponsored an afternoon showing of Dr. Bowman's remarkable colored film, "Galapagos Revisited," made while he was in the Galapagos Islands in 1957 as a member of the UNESCO mission to explore the possibilities of organizing a research center there. The U. C. L. A. Biomedical Library and Division of the History of Medicine, in addition. assembled a major exhibit as a part of the Society's Darwin celebration. The exhibit is available for loan to other institutions.

Dixon Young, 1958 graduate of the University of Southern California School of Medicine, won the John Fulton Medal Competition for his paper on "The Saints in Medicine."

Reprints of Dr. Edgar Mauer's June 1957 Society lecture on "Harvey in London," published in the Jan.-Feb. 1959 issue of the *Bulletin of the History of Medicine*, were distributed to the membership.

Active members 145, associate members 17, and honorary members 18, for a total of 177, is the present membership count. Officers for the year were Dr. Robert Tschirgi, President; Dr. Cyril Courville, Vice-President; Miss Louise Darling, Secretary; Dr. Charles Carpenter, Treasurer; and Mrs. Viola Warren, Archivist. Dr. Harrison Latta served as Program Chairman and Dr. Robert Moes as delegate to the annual meeting of the American Association for the History of Medicine.

LOUISE DARLING, *Secretary*

Society of Medical History of Chicago

The following is a report of the activities of the Society of Medical History of Chicago during the past year:

October 15, 1958: Dr. Robert M. Kark, F. R. C. P., Professor of Medicine, University of Chicago, "A Prospect of Richard Bright on the Centenary of His Death"

Richard K. Blaisdell, M. D., Assistant Professor, Department of Medicine, University of Chicago, "History and Mystery of the Spleen"

November 19, 1958: Noah D. Fabricant, M. D., Clinical Assistant Professor of Otolaryngology, University of Illinois, "Asthmatic Life of Marcel Proust"

Jordan M. Scher, M. D., Co-ordinator in Psychiatry, Northwestern University Medical School, "Haslam and English Psychiatry of the Early 19th Century"

December 17, 1958: Helmut P. G. Seckel, M. D., Associate Professor, Department of Pediatrics, University of Chicago, "The Vienna School of Pediatrics and the Concept of Allergy"

E. Lee Strohl, M. D., Associate Professor Surgery, Northwestern University Medical School, "Ladies of Lynn—Emphasis on One"

January 14, 1959: Eric W. Cochrane, Ph. D., Department of History, University of Chicago, "Francesco Redi: Physician, Microbiologist and Poet"

Leo M. Zimmerman, M. D., Chairman, Department of Surgery, Chicago Medical School, "Surgical Pathology in the Renaissance"

February 11, 1959: Steven Armentrout, School of Medicine, University of Chicago, "Hermann Boerhaave and the Rise of Clinical Teaching"

Jane Pascale, School of Medicine, University of Chicago, "The Dancing Mania: a Revaluation in the Light of Twentieth Century Knowledge"

March 11, 1959: John Chynoweth Burnham, Ph. D., Postdoctoral Fellow, Foundations' Fund for Research in Psychiatry, University of Chicago, "Syphilis and the Revolution in Morals"

Ilza Veith, Ph. D., Associate Professor, Department of History of Medicine, University of Chicago, "Hypnosis and Suggestion: Historical Reflections"

LEO M. ZIMMERMAN, *Secretary*

The William Welch Society for the History of Medicine

The William Welch Society for the History of Medicine of New York University College of Medicine has completed its first year of activity after its reinstatement into the American Association for the History of Medicine. Miss Helen Bayne, curator of the Man's Place in Nature Library at the New York University-Bellevue Medical Center, has acted as adviser to the society, and Steven Alexander and Harold Dick of the Class of 1960 were co-chairmen.

During the past year the society was privileged to have three distinguished men address the membership. At the first meeting a motion picture was shown of Dr. William Welch reciting some of the experiences of his outstanding career. Dr. John H. Mulholland, Professor of Surgery and Director of the Third Surgical Division in Bellevue Hospital, spoke on the "Prescience and Divinations of John Hunter."

At another meeting Dr. Paul Klemperer, Pathologist to Mount Sinai Hospital, read a paper on the "History of the Contracted Kidney."

We also had Mr. Henry Schuman, dealer in rare medical books and consultant to the Josiah Trent collection at Duke University, conduct a seminar dealing with the Claude E. Heaton collection. Dr. Heaton's collection of fine medical books containing many rare American items was recently acquired by the medical college library of New York University.

Members of the Society also attended the 1958 meetings of the American Association for the History of Medicine in New York City. We heard Dr. Heaton deliver the Garrison lecture at the New York Academy of Medicine. Dr. Heaton is Professor of Obstetrics and Gynecology, and Lecturer in the History of Medicine at the New York University-Bellevue Medical Center, and is a member and past officer of the William Welch Society.

STEVEN ALEXANDER
HAROLD DICK

Dr. John F. Fulton then moved that the Association place on record its gratitude to the Cleveland Medical Library Association, Cleveland Health Museum, Handerson Medical History Society, and Ohio Academy of Medical History, for their fine work which had made possible the splendid meeting in Cleveland. This motion having passed by acclamation, and there being no further business, the meeting was adjourned.

JOHN B. BLAKE, *Secretary*

TEXTS AND DOCUMENTS

AN ESSAY ON COUGHS BY LOCKE AND SYDENHAM

KENNETH DEWHURST

Amongst the Shaftesbury Papers in the Public Records Office are several medical essays in John Locke's handwriting. The most interesting one is "De Arte Medica" (1669)[1] which was first published by Fox-Bourne[2] in his biography of Locke, and later reproduced more accurately by Gibson.[3] This essay deserves the attention of philosophers in particular as therein Locke strikes a much louder note of pure empiricism than is to be found in his better-known philosophical works. Indeed, it is a somewhat ironic fact that Locke's medical and scientific works which are strongly impregnated with empiricism should have been so entirely neglected in favour of his philosophical writings, which for all their lasting value are confusing, as they set forth only a weak empiricism still plastered with the mire of rationalism and scholasticism. But although the scholars were right in their final assessment of Locke as the first great English empirical thinker, they reached this conclusion in an unscholarly way, as their views were based almost entirely on a study of Locke's famous *Essay on Human Understanding*, which reveals its author as much rationalist as empiric, whereas Locke's medical and scientific writings would have justified their claim in full measure. Hence a brief summary of some of Locke's medical essays may not be out of place as a prelude to presenting a hitherto unpublished essay written in collaboration with Thomas Sydenham.

Locke was physician to the Earl of Shaftesbury (or Lord Ashley, as he then was) when he wrote "De Arte Medica." Previously, whilst at Oxford, he had been greatly influenced by the iatro-chemists, of whom Boyle and Willis were the best known; but once he had settled in the metropolis, where he came under Sydenham's sway, the direction of his interests changed: henceforth he forsook speculation in a laboratory for practice at the bedside. At this time science in general, and clinical medi-

[1] Public Records Office, file 30/24/47/2, fols. 38-47.
[2] Fox-Bourne, H. R., *Life of John Locke (1876)*, I, pp. 222-7.
[3] Gibson, A. G., *The Physician's Art*, Oxford, 1933, pp. 1-13.

cine in particular, was undergoing one of the most important phases in its evolution. It was still (according to Boyle), "much more high and philosophical to argue *a priori* than *a postiori*," and Locke's essay was a protest against the current trends of hitching therapy to preconceived hypotheses. He begins by distinguishing between "a knowledge of physick" and "the rules of the art of medicine" (for which he professes respect only if they have been founded upon unbiased observation); and he then goes on to accuse his more conservative colleagues of confining medical knowledge within the narrow bounds of their own favourite hypotheses. He even suggests that some physicians deliberately discard facts based on their own experience in order to conform with the orthodox textbook opinions. In this special plead for empirical medicine Locke compares the physician's art with that of a cook: they both learn, according to Locke, by experience rather than from "speculative theorems."

In another essay ("Anatomie" 1668)[1] which was intended as part of an ambitious survey of medicine, Locke and Sydenham attack the views of the early experimentalists which had led to two schools of medical thought: the iatro-chemists and the iatro-physicists. But although Locke was not absolutely opposed to the work of these early scientists (for he had himself been one of their number), he firmly believed that anatomical research in particular was of limited value to the physician's main task of diagnosing and treating illness. These views were the result of Locke's close association with Sydenham's clinical work when he came to realize that a knowledge of the natural history of the disease he was trying to treat was more important to the physician than a knowledge of the basic sciences cognate to clinical medicine.

The present essay on coughs was written by Locke between 1668 and 1670, and only the last sentence is in Sydenham's handwriting.

It is now necessary to offer a brief explanation of the method I have adopted in transcribing this manuscript. Both Locke and Sydenham used many abbreviations, which have been written out in full. These are obvious ones, such as "yt" (that), "ye" (the), "wch" (which), "sd" (said), "agn" (again), and all words ending in "tion" were abbreviated to c̄on. Occasionally they used less well-known abbreviations such as "nāal" (natural) and "māal" (material). Locke's handwriting, though small, is neat and fairly easy to read, but he obviously wrote this essay in great haste as there are frequent alterations and additions between the lines,

[1] Reproduced by Kenneth Dewhurst in "Locke and Sydenham on the teaching of anatomy." *Medical History*, 1958, *2*: 1-12.

which, together with the variable spelling, make it difficult to decipher. Apart from writing out the abbreviations in full, the only other alteration has been the addition of a minimum of punctuation wherever its absence obscures the meaning.

Tussis [5]

Of the number that of those that are attaqued there with turns to that the other two kindes are as frequent to wit those that doe depend upon debilitations, and those that doe depend upon ulcers from pleurisys peripneumonias or any other hurt of the lungs. But in respect of the greatness of the symptoms which at the very first appear to be both by the looke of the patient and all other signes the very same (excepting that of the diarrhaea lethalis which comes not on till the end as well in this as the rest) with the most adult symptoms of the other two. I have not observed this to come on in any other than depuratory years.

The curative scope must be directd not to the cough but to the fever and accordingly the patient managed in all respects as in a depuratory fever viz 1° bleeding, then vomiting, giveing a clyster every other day till 10th day and then to give cordialls till 14th, then 17th day to purge keepeing the patient all this while in his bed with a fire in the roome and prohibiting flesh, and soe to remain from the time you bleed.

Another sort of cough is that which doth proceed from hurts of the lungs that end in abscesses or pleurisys not well carried off but ending in Empyemas in which the matter haveing through neglect caused such impostumation, bleeding which before would have prevented this mischiefe, now comes too late and indeed makes that which is the only cure of such impostumations dangerous, to wit the use of minerall purgeing waters which alone constantly persisted in, cures this disease when as hath been said bleeding hath not been used or very spareingly and a good while before.

Another sort of cough there is incident to children which comes on sometimes before the vernall equinox which is vulgarly called hooping or chime cough wherein the patient expectorates litle but is taken with a long continued act of coughing which rises higher and higher both in the straining and hooping noise untill at length the child grows black sometimes bleeds at the nose and foams at the mouth through the violence thereof.

This cough being occasiond by a great impulse of the bloud upon the

[5] Public Records Office, file 30/47/2, fol. 31/34 (R).

vessells of the lungs the curative intentions are to be directd only to revulsions and accordingly the child is to be bledd 1°, and afterwards purged upon which by degrees the cough will goe off without any more adoe save that it may be necessary to let it use the open country aire.

Tussis.

A cough is a symptom attending some disaffection of the lungs immediately, but primarily of the bloud which according to the severall ways of the blouds being distemperd may be distinguished into severall sorts.

1°. In that time of the yeare which is between spring and summer the bloud being by the constitution of the yeare put as it were into a new and livelyer fermentation, it doth (in those whose lungs by any weaknesse are disposd to receive impressions from the bloud) in its passage through the lungs either by steames riseing from it, or some hot and sharpe particles in it irritate the lungs and soe provoke to coughing. This vernall ebullition of the bloud if it prove very high grows perfectly febrile and begins as other fevers doe with a rigor and horror, and soe after some little continuance makes its self a vent into the lungs by a downright haemorrhage. Infants and contrarywise persons that are ancient are seldome troubled with this. Those of the midle age when endowd with those tender hot and loose habits of body are in the time of the yeare before mentiond most liable to it and are sensible both before the coming on thereof and likewise dureing the same of a heate and tendernesse in the upper parts of their breasts, and have likewise ever now and then a glowing and transient heat in their hands feet and divers parts of their bodys espetially their cheekes. (1)* Besides which and the cough its self I have not observd any other appearances peculiar to the disease but to the haemoptor febricitation somewhat more intense doth likewise belong and consequently from the inflammation of the bloud greater in this than the other the bloud when taken is puriforme as in pleurisie.

As to this cough which I call Tussis Verna other curative intentions are to be directed to these 2 points: the contempering and incrassateing of the bloud.

* *Marginal note*: (1) At the first comeing on of this cough they spit up noething but the streams that irritate the lungs being as they are excretd in upon the lungs sufficiently evacuatd by respiration, but after some continuance of the cough when the lungs come to be weakend, then they usually expectorate in the morning soe much as hath been spewd into the lung out of the bloud dureing the precedent night. This by degrees was not cured as well as all tother species of coughs hereafter to be mentioned by debilitating the lungs to such a degree that they are not able to concot their own nourishment throws the patient into a perfect phthisis wherein all the signes attending it doe show themselves.

In winter espetialy that part thereof which approacheth the winter solstice, the bloud being filled with a large proportion of cold and phlegmatick humors suitable to the time of the yeare doth usualy give some vent to them and ease its self of this load, discharge them either upon the lungs immediately, or else evacuating this humor by the glandules about the throat cause a distillation upon the lungs or the larynges, and by that irritation provoke coughing. This sort of cough though none be exempt from it, yet doth most familiarly seise children who are nearly full of pituitius humors, or else grosse and phlegmatique persons espetialy such as indulge to a sedentary life. From the very first beginning of the blouds dischargeing its self, there is a plentifull expectoration, if it begin with a cough, for some times the bloud makeing its first way by the glandules of the nose and those more remot from the larynx the first appearance is in a defluxion on those parts and sometimes where the caus is great a gravido, which commonly terminate also in this sort of cough. This defluxion in the beginning is constantly thin, how plentifully soever the matter be discharged, but after 4 days or thereabouts it begins to come to concretion and grow thicker and the patient feels some feverish heate in his outward parts, the urin is high and turbid with a gravelly sediment in the bottom. In some persons who are very phlegmatique and doe use the free aire and indulge not to the use of strong liquors the discharge is perfectly thin and pituitius dureing the whole time of the cough but in persons of more sanguin and robust constitutions who keep them selves hot and tenderly and that drinke strong liquors and take hot medecins the matter bakes up sooner and stuffes the passages of the lungs, from which and a great inflammation upon all the spirituall parts the cough is made, which I call Tussis callida per accidens, wherein the great violence of fits of coughing accompanid with straining and almost tearing of the lungs straitness of the breast great pains in the head ready as they call it to split their brains doth at last when they are ready to sinke for want of breath end in vomiting.

The cure of Tussis verna.

1° day bleed moderatly the next day purge. Then use the following: Rx conser. ros. rub. et syr. viol. $\overline{aa}$ 1 oz contundantur simul in mortar et p selaceum trajiciantur deinde adde syr de meconnio 1½ ozs sem papav. alb. aq. ceras nigror. et contusi 3 drachmas ol nuc mosel. p Express. gr. 4 celcema de quo lainbat saepe saepius. praecipue urgente tussi.

Rx sem melon pepon. et papav. alb $\overline{an}$ ½ oz contundantur in mortario seorsim affundendo aq. ceras. nigror 12 ozs sacchar. cand. alb 6 drachms

m. f. emulsio cap 3 ozs ter vel quator in die. The patient is to forbeare use of flesh and strong drinkes instead of which barly water is to be given. If the time of the yeare shall be a little advanced from the spring or the comeing of the disease approach on hyaemoptoe a bath of moderately warme water used once a day for 6 days will alone doe the businesse above all other remedies. (2)*

Tussis pituitosa.

The curative indications are to be directed to the lessening the pituitous matter in the bloud and the obviating accidents attending the discharge. As to the first lying a bed and keepeing in a warme roome contributes to the takeing away [of] that phlegmatique disposition in the bloud, but if the patient be either stronge or other wise hath passed the time [of the] first 4 days and begins to be feverish the open fresh aire is to be taken more plentifully than before it was to be avoided. Then as to the 2^{d} the great accident to be obviated is the bakeing up the pituitous matter too soon and the intruding the heat which attends it too much, in order to which strong liquors espetially any strong wine or vinous spirits are to be avoided being those things with which an infinite number of people have destroid them selves in stead whereof the ordinary liquor which the patient used in his health with the addition only of naturall heat is to be given and some moderate pectorall not too highly attenuateing is to be given. That this accidentall heat may not come on upon the account of the matters being not freely discharged, oyl of sweet almonds is beyond all comparison the best of this sort it being a well concocted medecin. This also I use: Rx decocti pectoralis 12 ozs croci in nodulo ligat ½ drachm capil veneris 3 ozs cap 4 ozs ter in die tepide. (1)*

But now if it hath baked up the accidents attending tussis calida per accidens are come on the curative indications are to be altred and to be directd to the takeing downe of the heat and in a manner to the bringing on a new rawnesse as it were upon the bloud to which purpose 1° bleed, purge next day, and soe 3 times alternis diebus intermixing the pectorall decoction without safron addeing syr viol. et capill ven $\overline{\text{an}}$ 2½ ozs and syr de meconio each night after purgeing. But now if firm *Tussis*.

It was said before that when the lungs have been long debilitated by any

* This number (2) which appears in the manuscript may have been intended to refer to a note which, however, was not added.

* *Marginal note*: (1) When this cough comes on every winter and is attended with an asthma in aged men the advance of the summer only can cure it for that season and it will returne next winter.

of those coughs that there is a danger of a phthisis, in which state the cough haveing run with ease a great diuturnity and being sometimes crude and some times concoctd without any setled order it is then altogeather in vain to expect a remedy from any medecins that I yet know, for in this case the curative intention being to be directd to the strengthening of the bloud soly, and noe medecins doeing the same that doe not heat and at the same time irritate the lungs this indication can be satisfied by noe other way in my opinion than by rideing which, being persisted in some months togeather, will I am sure cure any thing beneath the highest degree of a downright phthisis. For by churneing the bloud and puteing the severall secretory parts upon performing their functions the bloud at length arrives to that perfect condition which can possibly be incident to the pneumogenicall constitution and age of the patient, for if we doe consider how many 1000 succussins of the body, and that in a free aire, are made in one day what humor can we suppose to be soe stubborne but this exercise if persisted in must discusse, what purulent matter or other substance but it must qua data porta through off and what naturall heat soe languid but it must excite to help all off. Never the lesse these cautions must be observed generall evacuations must be made before the exercise be ingaged on. The patient must be injoynd to ride gently at first and to increase his journey by litle and litle untill he be able to perform an ordinary day's journey which must be uninterruptedly continued untill he has perfectly recovered his health observing all this while noe diet but such as is most gratefull to him.

There are other species incident to all times of the yeare indifferently the most considerable of which I shall here recite. The chiefest of which is that which happens in depuratory years which is most incident to young persons, and, for the most part, comes upon this occasion, the patients having heated himself with exercise and afterwards taken cold either by lying on the cold ground or leaving off some accustomd clothes, is suddenly seized on with a rigor and horror succeeded with a feavor of that season which presently, is terminated with a violent cough, the cold indeed being noething else than the fever invertd which no longer appears a fever, but exercises however its tragedies in another appearances and doth that in some months which the other would have done in a few days.

This is the great consumption of mankinde in respect not soe much of. . . .

The essay ends abruptly in the middle of a sentence. Then this marginal note was added by Sydenham:—

"Here the cures done by riding are to be brought in reference to the cure of consumptions and morbi obscuri."

Why was this essay written jointly, and who was the main author? There are probably two reasons for this joint authorship. About the time it was written, Locke was particularly prone to respiratory infections (aggravated by the smoky metropolitan air) which left him with a cough for the rest of his life. He firmly believed that he had phthisis which disease had carried off his brother; but it seems more likely, in view of his subsequent history, that he was suffering from asthma and chronic bronchitis. Hence his special interest in respiratory diseases is understandable, and it is reflected in the numerous prescriptions for cough cures in his journals. One such entry appears on Saturday, June 18th, 1681:—

> Dr. Sydenham's way of cureing a phthisis was strong drinke keepeing in bed and a clyster every day. The way I cured my self was keepeing constantly in bed for about a fortnight (a month I thinke had been better could I have spared it) eating and drinkeing as I use to doe at other times and takeing about 1 drachm Theriac. Androm. Veter every night.[6]

As this essay was written by Locke and Sydenham it poses the intriguing question as to the exact nature of their relations in medical matters. It was almost certainly one of master and pupil with Sydenham introducing Locke to the art of clinical practice, whilst the latter acted as Sydenham's secretary on occasions and thereby helped him to get his views on paper—a task which was somewhat distasteful to Sydenham's practical mind. Although most of this essay is in Locke's handwriting, the phraseology bears Sydenham's stamp, and judging by the frequent corrections and poor handwriting, it was probably taken down in haste at his dictation. There is some evidence in support of this view. In one of Locke's medical commonplace books entitled "Extracts of Sydenham's Physick Books and some Good Letters on Various Subjects,"[7] there is an essay called "De Phthisi" which was written by an amanuensis and annotated "ex ore Syd." by Locke. This notebook was published by Dr. W. G. Greenhill as *Anecdota Sydenhamiana* (1845), and in the preface Greenhill mentions that these notes were written partly at Syden-

[6] MS Locke f. 5, pp. 68-9. Bodleian Library.
[7] Rawlinson MS, C. 406. Bodleian Library.

ham's dictation, whereas others were copied from his manuscripts. Furthermore the substance of the views expressed in " Tussis " is reproduced in " De Phthisi " and also in Sydenham's *Processus Integri* (1692). Hence this triple connection would lead one to conclude that all three essays (though somewhat differently worded) reflect what are essentially Sydenham's views. But they also illustrate the remarkable co-operation between England's greatest philosopher and the most renowned English physician.

I would like to thank the trustees of the Wellcome Trust for a grant in aid of expenses incurred in the preparation of this paper.

NOTES AND COMMENTS

A CLASSIC OF MICROSCOPY: AN EARLY, IF NOT THE FIRST, OBSERVATION ON THE FLUIDITY OF THE AXOPLASM, MICROMANIPULATION, AND THE USE OF THE COVER-SLIP

HEBBEL E. HOFF

When in 1934 (1) John Z. Young reported his microscopic observations on the " Structure of Nerve Fibres in *Sepia*," demonstrating the fluid nature and other details of the microscopic structure of the axoplasm in the giant axon of the squid, I was struck by the similarities between his findings and those published a hundred and fifty years earlier—and completely neglected thereafter—by that most ingenious Abbé, Felice Fontana, whose activities have long interested me (*2*, *3*). Now, a quarter of a century later, Dr. Young's report is a classic in its own right, not alone for its description of the axoplasm, but because it brought the giant axon of the squid to the attention of neurophysiologists as a " very suitable material for the study of the living nerves "(1).

Young's report was made at a meeting of the Physiological Society of Great Britain on November 17, 1934, and was published as follows in the Proceedings of the Physiological Society, with a camera lucida drawing that is reproduced here also:

> The nerve fibres in the peripheral trunks of Cephalopods vary in diameter from from less than 1 μ to giant fibres of nearly a millimetre, but all have a similar structure. Each fibre consists of a sheath of connective tissue enclosing a single axon, there being no visible space between the two. The nuclei of the sheath, projecting inwards, often make a dent in the surface of the axon. After fixation in osmium tetroxide both sheath and axon are stained light grey, but there is no trace of anything comparable to a myelin sheath.
>
> The giant axons provide very suitable material for study of the living nerves. No definite neurofibrils could be seen in them, but under the highest powers of the microscope a very fine longitudinal striation could be detected. This appears to be due to the presence of large numbers of exceedingly small granules, almost at the limit of visibility, which are orientated in rows along the fibre. The rows are not straight but wavy, making an inward curve, for instance, where a sheath nucleus projects into the axon.
>
> After a giant fibre has been cut the contents flow out from the end of the con-

nective tissue sheath (Fig. 1). This remarkable process continues for many minutes as the axon pours slowly from the tube, which itself collapses like a deflated balloon. The substance which emerges forms an irregular mass at the cut surface, not mixing with the sea water unless disturbed. The fine granules can be seen to lose their orientation as the liquid emerges, so that no trace of fibrillar arrangement remains in the resulting mass.

The axons of the smaller fibres do not flow out rapidly as do those of the giant fibres, presumably being retained in their narrower tubes by surface tension. But they nevertheless resemble the giant fibres in consistency, and chronic experiments have shown that after section of a nerve the regeneration of the fibres begins as a slow outflow.

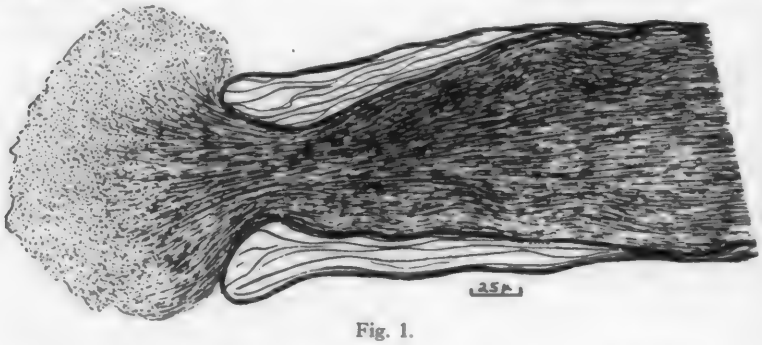

Fig. 1.

Giant fibre from stellar nerve of *Sepia*, drawn 12 min. after it had been cut.

In view of this capacity of the axons to flow out from their sheaths, it is very difficult to believe that neurofibrils exist in the living nerves as any form of rigid wires. Rather the axon should be regarded as a homogeneous, viscous fluid, filling its connective tissue sheath and containing very fine micellae orientated along the length of the fibre.

Fontana's description of the axoplasm was contained in a letter to his friend Gibelin, in Aix-en-Provence, who had earlier stimulated the interest in toxicology that culminated in the most widely-known of Fontana's works, his *Traité sur le venin de la vipère* (4). The letter was published in the *Journal de Physique* some two years later (5). In this letter Fontana first replied to Gibelin's enquiry about recent reports from Italy on the value of intravenous injections of ammonia-water in the treatment of snake-bite, demonstrating the lack of any efficacy in a few well-controlled experiments in rabbits and sheep, and pointing out some of the pitfalls of post-hoc reasoning. The remainder of the letter he devoted to a description of the microscopic appearance of the axoplasm as it extruded from the cut end of an axon compressed by an ingenious micro-

manipulator—itself an original contribution of real merit. The reader will also note that Fontana used a cover-slip; this is almost certainly the first mention of its use. As the first description of the fluid nature of the axoplasm, and in all likelihood as the first report of micro-manipulation and the first use of the cover-slip, the short excerpt from his letter that I have translated as follows deserves a place as a classic of microscopy:

> If you had not asked me to tell you my opinion about the new Italian specific, I should not have thought, at least for the present, of making any experiments on a subject that has for a long time begun to weary me, and on which it could be said that I have spent more time than was necessary. Such at least is the opinion of the Philosophers, who believe they can divine the secrets of Nature in their offices, and think nothing of substituting dreams and hypotheses for facts and the truth. But since I have begun to speak about my work on the poisons, and since you are the principal cause of it, permit me to say a few words to you about nerves, which will serve to clarify what I have written in the second volume of the same work. I do not propose to enter into any details, reserving that for another occasion; then, to give greater clarity I shall give several figures, which will serve to supplement the work itself, and which will be inserted in my Microscopic Observations, about which I have spoken to you several times. Having decomposed a very small nervelet into its ultimate nervous filaments, composed of different primitive nervous cylinders, of which I have spoken all along in my book, I succeeded in stripping off from the last internal envelope, or tortuous filaments, several of these primitive nervous cylinders; they were transparent, homogeneous, not empty, and as I had found them on other occasions.
>
> The idea came to me to place them between two crystals, arranged in such a way that I could make them approach one another, to the point of touching their opposing faces, and to compress completely the material placed between them. I can bring a very strong lense close to the upper crystal, which is the thinner, and this lens serves me to observe what happens as the glasses approach each other by insensible degrees and compress the objects. This little instrument, which I devised and had made several years ago, is of a very great utility in the most delicate microscopic observations, and I owe to it many important truths that I shall not have known without its help, as will be seen one day in my Microscopic Observations.

Examining thus a little mass of different primitive nervous cylinders with my instrument, I noticed that in proportion as I approximated the two sheets of crystal, there ran out of these crushed filaments a glutinous, elastic, transparent material, which the water in which the filaments bathes could in no way dissolve. When two or more neighboring cylinders were compressed together, the glutinous materials of the one did not mix at all with those of the other, although these different materials were mutually compressed, and the one pushed aside the other.

Continuing to compress the cylinders more and more, I came to notice that the glutinous material decomposed itself into little round grains of a diameter four or five times less than a red blood globule. I saw on this occasion that many of the little grains flowed with great celerity in the center of the primitive cylinders, and ran out at the cut ends of these cylinders. In this state, the water of the slide transported them with great rapidity from one place to another, and they did not reunite to form the glutinous material. This glutinous material, examined with the strongest lenses, at the moment when they [the grains] leave the primitive nervous cylinders, seemed to be formed of granular filaments, tenacious and elastic, which the water could neither dissolve nor separate. I confirmed this observation several times on several kinds of nerves, in several animals, and even in man, so that I do not fear to certify to its verity. It is thus necessary at present to consider the nervous cylinders as true canals, containing an elastic, glutinous, graniform material; that at least is where observation leads us.

I do not know if the Physiologists would like to regard the little grains that I have observed as the animal spirits, and as the mechanical principle of all movements. In such hypotheses one would have difficulty in explaining the instantaneous velocity of animal motions; for these little grains seem too slow to move when they are in the nerve, where they form more a viscous and inert glue than a subtle and very mobile fluid, as it seems there ought to be. Animal movements could be explained more easily by supposing that the graniform material is elastic, and continues throughout the whole length of the nerve canal, as observation demonstrates. The measurement could be transmitted in the very moment there is a mechanical alteration, or a disturbance in any part whatever of the nerve. This kind of nervous movement is indeed different than the movement attributed to animal spirits; it differs also from the hypotheses in-

vented by the Solidists, who make the whole nerve enter into vibration.

Thus the existence of these imaginary animal spirits flowing from one part to another does not seem to be compatible with the observations that I have just reported, and the vibration of nerves is contrary to experience and to the structure of the nerve itself. But it would not be at all absurd to think that the elastic, gelatinous material which fills the primitive nervous cylinders, could have insensible vibrations similar to those of the air in the formation of sound; that is to say, without there being any transport of particles from one place to another.

This is what I have seen in the nerves, and this is what I believed most reasonable to say, starting from sound facts and my own observations, without creating hypotheses and invisible fluids, which are easy to invent and difficult to prove. You see thus, that if one expects any progress in theoretical or practical medicine, it will be due only to experience and observation; but it is necessary that one and the other be guided by reason, and that they present a very exact analysis of the truth that one wishes to establish. Scattered facts and isolated experiments will never form the basis of new theories or new principles. We see only too many proofs of this in many modern writers.

The author gratefully acknowledges the permission of Professor J. Z. Young, M. A., F. R. S., and of the *Journal of Physiology* to reproduce Professor Young's article.

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MEDICO-HISTORICAL NEWS AND ACTIVITIES

CORRESPONDENCE AND REPORTS

NATIONAL INSTITUTES OF HEALTH

Research Grant Awards in the History of Medicine

A number of the National Institutes of Health at Bethesda, Maryland, research arm of the Public Health Service, are now supporting research in the history of medicine. Since the June 1957 resolution recommending support of this area which was passed by the National Advisory Mental Health Council,[1] endorsement of support in the history and sociocultural aspects of medicine has been given by the National Advisory Council for Neurological Diseases and Blindness, the National Advisory Cancer Council and the National Advisory Health Council.

The following awards have been made in the past year:

Grants of the Division of General Medical Sciences

Dr. Saul Jarcho, New York Academy of Medicine. A three-year grant in the total commitment of $18,446 for research on a "History of Medicine in the United States."

Dr. Genevieve Miller, Cleveland, Ohio. A one-year grant in the amount of $900 to complete "A Bibliography of the Writing of Henry E. Sigerist."

Dr. Francisco Guerra, Yale University. A three-year grant in the total commitment of $51,259 for a study of "Pre-Columbian and Colonial Medicine in the United States."

Dr. Hebbel E. Hoff and Mr. Ariel Bar-Sela, Baylor University College of Medicine. A grant in the amount of $2,300 to prepare a translation of Maimonides' "Regimen of Health."

Grants of National Cancer Institute

Dr. Esmond R. Long, Pedlar Mills, Virginia. A two-year grant in the total commitment of $4,600 for a "History of American Pathology."

Grants of the National Institute of Mental Health

Dr. Eric Carlson, Cornell University Medical College. A three-year grant in the total commitment of $50,566 for a study of the "Development of Psychiatric Thought in the United States."

Dr. Gregory Zilboorg, New York, N. Y., and Dr. George Mora, Providence, Rhode Island. A three-year grant in the total commitment of $75,912 for an anthology in the history of psychiatry, "The Foundation Stones of Present-Day Psychiatry."

[1] See this *Bulletin*, January-February 1959, pp. 67-74.

Dr. Gerald Gruman, Cambridge, Massachusetts. A two-year grant in the total commitment of $4,250 for a "History of Prolongevity Hypotheses." [Dr. Gruman has since released this award to accept an NIMH post-doctoral research fellowship.]

Dr. Iago Galdston, New York City. A three-year grant in the total commitment of $15,825 for a "History of Medical Education."

Research Fellowships

In addition to the award of research grants, a number of pre-doctoral and post-doctoral research fellowships have been made by the National Institute of Mental Health for study in the history of medicine.

Following are research fellowship awards in this field:

Mrs. Patricia Spain Ward, Johns Hopkins University. Research Project: "A Study of American Medical Thought and Practice as Illustrated by the Life of Dr. Simon Baruch, 1840-1921."

Mr. Theodore Jurgen Spahn, University of Chicago. Research Project: "The Development of the London Voluntary Hospital During the Latter Half of the 19th Century."

Mr. E. Alan Richardson, University of Chicago. Research Project: "The Clergymen-Physicians of the 17th Century England and America: A Study in the Care and Healing of Souls."

Mr. Charles E. Rosenberg, Columbia University. Research Project: "A History of Cholera in the United States."

Dr. Gerald Gruman, Harvard University. Research Project: "A History of Prolongevity Hypotheses."

Mr. Allen Debus, Harvard University. Research Project: "The Evolution of Paracelsian Medicine and Chemistry in England."

Mr. Richard Grant, University of Chicago. Research Area: "Communication of Medical Knowledge."

Further information on research grants in the history of medicine may be obtained from Dr. Jeanne Brand, Medical Research Program Specialist, National Institute of Mental Health, Bethesda, Maryland.

Persons interested in obtaining information on research fellowships may write to Dr. Stephen P. Hatchett, Acting Chief, Research Fellowships Review Branch, Division of Research Grants, National Institutes of Health, Bethesda, Maryland.

ANNOUNCEMENTS

AMERICAN ASSOCIATION FOR THE HISTORY OF MEDICINE, INC.

THIRTY-THIRD ANNUAL MEETING: CHARLESTON, S. C., MARCH 24-26, 1960.

The Thirty-third annual meeting of the American Association for the History of Medicine will be held in Charleston, S. C., March 24-26, 1960. The Association's host will be the Robert Wilson Medical History Club. Dr. J. I. Waring is chairman of the Committee for Local Arrangements.

Members who wish to present papers are asked to send an abstract of not less than 500 words to the chairman of the Program Committee, Dr. Paul F. Cranefield (State University of New York, Downstate Medical College, 450 Clarkson Avenue, Brooklyn 3, N. Y.) not later than January 1, 1960.

THE WILLIAM OSLER MEDAL

The William Osler Medal of the American Association for the History of Medicine is awarded annually for the best unpublished essay on a medico-historical subject written by a student in one of the medical schools of the United States or Canada. This medal commemorates the great physician, Sir William Osler (1849-1919), who generated a love for the humanities among students and doctors alike.

Essays submitted should not exceed 10,000 words in length, and should demonstrate either original research or an unusual understanding of a medico-historical problem. It is expected that the student will seek help only from faculty advisors, and from sources open to all investigators, such as libraries and museums. The prize-winning essay may be considered for publication in the *Bulletin of the History of Medicine* which is the official organ of the Association.

All students are eligible and may submit essays at any time up to the next entry date after graduation. The next entry date terminates March 1, 1960.

Essays should be submitted to:

DR. SAMUEL X. RADBILL
7043 Elmwood Avenue
Philadelphia 42, Pa.

WILLIAM OSLER MEDAL COMMITTEE:

Walton B. McDaniel, 2d, Ph. D., Philadelphia, Pa.
Leo M. Zimmerman, M. D., Chicago, Ill.
Samuel X. Radbill, M. D., *Chairman*

NATIONAL NEWS

Bertha Spector Fund

A fund has been set up in memory of Bertha Spector, late wife of Dr. Benjamin Spector, President of the A. A. H. M. 1956-58 and Professor of Bioanatomy and

History of Medicine at Tufts University Medical School, Boston. The fund, which has gained wide support among students, faculty, and friends of the Spectors, will present annually a certificate and medal of recognition to a student submitting an essay of academic distinction in the field of the history of medicine.

History of the Behavioral Sciences Newsletter

The first issue has been received of a mimeographed newsletter to be issued at irregular intervals, whenever there is sufficient material to warrant publication. The newsletter is directed toward anthropologists, psychiatrists, psychologists, and sociologists, and any others working in the area. Suggestions are requested and should be sent to: Dr. Eric T. Carlson, Payne Whitney Psychiatric Clinic, New York Hospital, 525 East 68th Street, New York 21, New York.

Pharmacy in History

Pharmacy in History begins publication with Vol. 4, No. 1, 1959, (32 pp.), as a continuation of *A. I. H. P. Notes* which suspended publication at the end of 1957. The new journal will appear quarterly, one number to be devoted mainly to the report of the annual meeting, and will try to provide a stimulus to historical writing, reading, or collecting, AIHP information, and news of events and people that concern the humanistic interests of the pharmacists.

Urdang Medal

The American Institute of the History of Pharmacy has conferred the fifth Urdang Medal on Maurice Bouvet, pharmacist-historian of Paris. Dr. Bouvet was cited particularly for his book on the development of pharmacy in France, (*Histoire de la Pharmacie en France des Origines à Nos Jours*, Paris, 1936, 445 pp.), as well as for his monographic research.

Yale

Yale University has announced the appointment of Dr. Derek John de Solla Price, Ph. D. of the Universities of London (1946, Physics) and Cambridge (1954, History) as Visiting Professor of the History of Science for the academic year 1959-60. In his statement concerning the appointment Professor George W. Pierson, Chairman of the Department of History, stated that Dr. Price would be a member of the Faculty of the Graduate School and that he would give general lectures on the history of science to undergraduates in Yale College and supervise advanced students in history in the Graduate School; Dr. Price would also be free to give special seminars and conduct research in other University Departments including that of the History of Medicine in the Historical Library of the Medical School. During the past year Dr. Price has been associated as John W. Donaldson Fellow and Member of the School of Historical Studies at the Institute for Advanced Study, Princeton, New Jersey.

Wisconsin

The University of Wisconsin has announced the appointment, effective January 1, 1960, of Gernot B. Rath, M. D., as Associate Professor and Chairman of the History of Medicine in the University of Wisconsin Medical School. Dr. Rath

comes from the University of Bonn, Germany, where after receiving his M. D. degree in 1948, he turned to the study of the history of epidemics, anatomy in the Middle Ages, and medical writing in the 16th and 17th centuries. Dr. Rath was visiting professor of medical history in Wisconsin during the second semester of the 1958-59 school year. Members of the Association had the pleasure of hearing Dr. Rath at the Cleveland meeting and the *Bulletin* is happy to welcome him to America.

NEWS FROM ABROAD

Germany

The *Nachrichtenblatt* of the Deutsche Gesellschaft für Geschichte der Medizin, Naturwissenschaft und Technik E. V., No. 13, May 1959, announces the eleventh annual meeting of the Society, September 19-23, 1959, in Bamberg and gives the tentative program. Main themes of the meeting are to be "Alexander von Humboldt und seine Zeit" and "Wissenschaft und Technik im späten Mittelalter."

Italy

Under the auspices of the President of the Republic, the Italian Center of History of Hospitals has undertaken to organize the First European Congress of History of Hospitals which will be opened in the Spring of 1960 in Reggio Emilia, and will pursue its activity in the University-towns of the Emilia-Romagna district (Northern Italy). Besides official reports from representatives of several nations of Europe, scientific communications will fall within the following divisions: a) Historical Aspects of Hospital Technique; b) Evolution of the Hospital Institute under the Jural and Economic Aspect; c) Ethical—Cultural—Scientific—Social—Pedagogic and Religious Function of the Hospital Institution in the Course of the Past Centuries. General Organizer of the Congress is Walter Soliani Raschini; Secretary of the Committee of Promoters is Maria Bertolani Del Rio.

BOOK REVIEWS

LELLAND J. RATHER (translator). *Disease, Life, and Man: Selected Essays by Rudolf Virchow.* Stanford, California: Stanford University Press, 1958. vii + 273 pp. $5.00. (Stanford Studies in the Medical Sciences, IX)

1958 marked the end of the first hundred years of cellular pathology, if its beginning is dated by the publication of Rudolf Virchow's *Die Cellularpathologie.* Dr. Rather's translation of ten of Virchow's writings, which form the basis for *Disease, Life, and Man,* comes at a most appropriate time as we begin the second century.

These essays deal with medical subjects and span half a century, or ten years less than Virchow's own scientific career. The first, published in 1847, is entitled "Standpoints in Scientific Medicine" and was the leading article of volume 1 of his *Archiv für pathologische Anatomie und Physiologie und für klinische Medicin* which has had such wide success for over a hundred years, currently having reached volume 332. In his introduction Virchow charts a course for his publication according to his concepts of scientific medicine and scientific investigation and the relation of pathological anatomy to all. This essay should be required reading for all pathologists today, particularly those who are concerned with the present state of pathology in America. Virchow ends his essay as follows: "Only calm, industrious, and steady work, true work of observation or experiment, has permanent value. Pathological physiology will then gradually reach full fruition, not as the creation of a few overheated heads, but from the cooperation of many painstaking investigators; a pathological physiology which will be the stronghold of scientific medicine, where pathological anatomy and the clinic are only the outworks!"

Thirty years later he wrote another introduction, this time for volume 70 of his *Archiv,* at which time he placed the publication "at the disposal of another generation." By now cellular pathology had become firmly established. Here he stipulates "that pathology must be an independent science." Further, he says "that the emancipation of pathology, and its elevation to the rank of a natural science requires above all else that pathologists guard their independence and let no foreign science intrude its hypothesis into pathology, if pathology is not to be relegated again to the position of mere applied science. We can do this only *if we remain at our tasks and accomplish something.*"

An essay, which of necessity was partly autobiographical, is "One Hundred Years of General Pathology." Here Virchow gives us his own evaluation of his predecessors and how their contributions shaped his own thinking. Moreover, the continuity between theirs and his own contributions is brought out. He further indicates how his cellular pathology has affected scientific medicine during the second half of the century. For a brief view of the field by one who obviously had the greatest influence on it, this story is unsurpassed. Another essay "The Place of Pathology among the Biological Sciences," which Virchow read before the Royal Society in 1893, deserves mention if only to compare it with an address delivered

in 1889 by Dr. Welch, entitled "Pathology in its Relations to General Biology." Virchow, after reviewing the genesis of cellular pathology, says that pathology has a very honorable place in the science of biology, for to it "we owe the realization that the contrast between health and disease is not to be sought in a fundamental difference of two kinds of life, nor in an alteration of essence, but only in an alteration of conditions." Welch says "the separation between normal and pathological biology is not sharp. The presence of the one encroaches at many points upon that of the other. Mutual aid is to be derived from a closer union between normal and pathological biology. The pathologist should not be content with methods of research less perfect than those employed in normal biology. He should not rest satisfied with results which stop at the mere description and classification of marked processes. To be able to give a name to some pathological lesion, and to make it fit into some accepted scheme of classification, should not be the sole aim of pathological study. The more a pathologist is imbued with the spirit of modern biology, the less content will he be to stop at this descriptive phase." Space does not permit comment on the other essays which Dr. Rather has included. Some titles are: "On Man," "On the Mechanistic Interpretation of Life," and "Atoms and Individuals."

Dr. Rather, who is a Professor of Pathology at Stanford University, has contributed an introduction to the collection as well as notes for the individual essays. His introduction discusses problems of scientific methodology from the standpoints of William Harvey, Claude Bernard, and Virchow himself. Anyone engaged in scientific investigation will find these pages of interest. Every student of disease will discover that Virchow's own words are as timely and as provocative now as they were on the day they were written, or perhaps even more so. Dr. Rather and the Stanford University Press are to be congratulated for making them available at this time.

R. H. Follis, Jr.

Herbert Thoms, *The Doctors Jared of Connecticut.* Hamden, Connecticut: The Shoe String Press, 1958. 76 pp. Ill. $3.00. (Department of the History of Medicine, Yale University School of Medicine, Publication No. 35.)

This interesting book is an account of the life and work of three remarkable physician-naturalists from Connecticut. Its author, Dr. Herbert Thoms, Emeritus Professor of Obstetrics and Gynecology at Yale University, dedicates his work to Lucia and John Fulton, colleagues in New Haven. An accurate, concise study, *The Doctors Jared of Connecticut* brings together in one volume a rich trove of formerly uncollected biographical material about a unique trio in American medical history. With evident fondness for and familiarity with his heroes and their locales, the author recalls his men from the past: Drs. Jared Eliot, Jared Potter, and Jared Kirtland.

Jared Eliot (1685-1763), the first of the trio, graduated from Yale College in 1706 and served as clergyman and physician at Clinton, Connecticut, during most of his life. He combined a dedicated ministry in the Congregational Church with medical practice and teaching, and several of his medical apprentices became eminent in medicine and natural science.

Dr. Eliot was a faithful Trustee of Yale College in its early years. His bequest to the Yale College Library, the first contribution made to its funds, is memorialized there today by a group of friends of the Library, called the Jared Eliot Associates.

Friendship and correspondence with prominent men of his time brought Eliot into contact with Dean Berkeley, Irish benefactor of Yale College, Benjamin Franklin in Philadelphia, and Samuel Johnson, first president of King's College, now Columbia University, in New York. Jared Eliot published several studies in agriculture and metallurgy: *Essays upon Field-Husbandry in New England, as it is or may be ordered* (1748), and *Essay on the Invention, or Art in making very good, if not the best iron, from black Sea-sand* (1762).

Jared Potter (1742-1810), graduate of Yale in 1760, became one of Jared Eliot's most famous medical pupils. He served as a surgeon on General Richard Montgomery's ill-fated invasion of Canada during the Revolutionary War before returning to a successful practice at Wallingford, Connecticut. Like Jared Eliot, he was interested in agricultural and horticultural subjects; Potter introduced silkworm culture at his farm upon the instance of his friend, Benjamin Franklin.

Dr. Potter was a founder of the New Haven County Medical Society in 1784 and became first secretary of the Connecticut Medical Society in 1792. As a token of esteem, the latter body awarded him an honorary M. D. degree in 1798. His library was one of the most extensive in Connecticut; it is now in the Library of Western Reserve Medical School, a gift of Dr. Jared Potter Kirtland.

Jared Potter Kirtland (1793-1877), son of a physician and grandson of Dr. Jared Potter, became the first matriculant of the newly formed Medical Institution of Yale College in 1813. He received the M. D. degree two years later, following an interim year in medicine at the University of Pennsylvania.

In 1820, following the death of his wife and one of two daughters during an epidemic, Kirtland moved to Poland, Ohio, where his father had settled seventeen years earlier. The younger Kirtland here continued his studies in natural history, contributing noteworthy scientific papers in botany, geology, and zoology. He described the songbird, Kirtland's warbler, his lasting memorial, in 1851. An organizer of the Cleveland Academy of Sciences in 1845, he served as its first and only president until 1865, when it was reorganized as the present Kirtland Society of Natural History.

In 1837 Dr. Kirtland became professor of the theory and practice of medicine at the Medical College of Ohio at Cincinnati; for three years after 1840 he taught at the Willoughby Medical School, and in 1843 became Professor of Medicine at the Cleveland Medical School, now the School of Medicine at Western Reserve University—of which he was also a founder.

Jared Kirtland served as president of the Ohio State Medical Society in the second year of its existence. 1850 he added to his many activities the editorship for three years of the Ohio *Family Advisor*, a weekly magazine pertaining to literary and social matters. Like his grandfather, Kirtland was an opponent of slavery; he served as an examining physician for recruits and veterans during the Civil War. Known locally as "The Sage of Rockport," this Ohio educator, naturalist and physician was widely known in his country. He was a member of the American Academy of Science and the American Philosophical Society. In 1861, Williams College conferred upon Kirtland the honorary degree of Doctor of Laws.

Although the lives of Jared Eliot, Jared Potter, and Jared Kirtland spanned almost two centuries, historically they belong together. Their influence on American medicine and natural science was outstanding at the time and of enduring value. Dr. Thom's readable book about the lives and work of these three courageous men is a valuable contribution to the cultural and professional history of our nation.

FRED B. ROGERS

RICARD ARCHILA. *Historia Médica de Venezuela: Guayana.* Caracas: Imprenta Nacional, 1958. 174 pp. Ill.

This is a history of the National College of Guayana for the centenary of its Medical School. Located in Ciudad Bolívar, formerly Angostura, State of Guayana, now Bolívar, the medical school was founded in 1859 as part of an older mid-eighteenth century college. National Colleges of first rank, some of which became universities, at first included secondary education. Primary education was in private hands. Ciudad Bolívar had both.

Factors which encouraged the founding of the medical school were isolation of the city from the rest of the country (with no roads, the River Orinoco was its only means of egress and it was a busy port for foreign and domestic commerce), existence of two hospitals, and eight practicing physicians, and, most important, adequate funds in the National College, plus political tranquillity.

The National College of Guayana originated in 1772 in Angostura, as a missionary school. Authorized as a National College in 1824 by Colombia (New Granada), it was not established till 1834, after separation of Venezuela from Colombia. The building had been governor's seat and bishop's palace. Solemn institution occurred in 1840 for the lower, and in 1846 for the upper, school; bachelor's degrees were not given till 1850.

College and medical courses were grouped as "biennia," two in college and one in medical school at first, later extending to two four-year courses. Languages, classics, and mathematics were taught as preliminaries. Medical courses included Anatomy, Physiology, Hygiene, Pathology, Obstetrics, Surgery, Chemistry, Therapeutics, Legal Medicine, Toxicology. Later, Medical Chemistry, Histology, Bacteriology, Gynecology, Pediatrics, Anthropology, and History of Medicine were added.

Income in both College and Medical School was derived from old Spanish grants and State grants. Tuition was free except for boarding students, who paid 100 pesos annually. Registration cost 20 reales, and students had to pay 10 pesos each for Anatomical laboratory equipment. Cadavers were obtained from the Charity Hospital. Three-hour oral examinations were given at the end of each course. The students published a medical periodical and organized medical societies.

The professors' salaries, Rector 300 pesos, Vice-Rector and Professors 250 pesos annually, were frequently in arrears. Yet they continued to teach, showing immense devotion to the cause of medical education.

The University College and Medical School was discontinued in 1904, having granted 288 bachelor's degrees and 77 doctorates, 34 and 37 each in Medicine. The foundation is now used as a secondary school for boys.

GEORGIANNA S. GITTINGER

Medical Department, United States Army. *Preventive Medicine in World War II:* Volume IV, Communicable Diseases Transmitted Chiefly Through Respiratory and Alimentary Tracts. Edited by JOHN BOYD COATES, JR. and EBBE CURTIS HOFF. Washington, D. C.: Office of the Surgeon General, Department of the Army, 1958. xxi + 544 pp. Ill. $5.50.

There are medical histories of each major war in which the United States Army was involved. When this country was pushed into World War II the Division of Medical Sciences of the Medical Research Council formed a Subcommittee on Historical Records. Among the seven men on this committee were Drs. John F. Fulton, George W. Corner, Edward B. Krumbhaar and Henry R. Viets, all living past presidents of the American Association of the History of Medicine (Fulton, John F., M. D.: "Prospectus of a Medical History of the War of 1941 to 19—." *War Medicine,* 1942, *2*: 847-859). The military medical services were thus early alerted to the need for accumulating data that would be useful in the future.

Now, in this volume, under the aegis of an imposing advisory editorial board on the History of Preventive Medicine and an equally impressive group composing the Historical Unit of the United States Army Medical Service, twenty-one competent contributors, each a specialist in his own sphere of medical practice, have assembled a comprehensive account of the prevention and control of communicable diseases related to the respiratory and alimentary tracts during the late war. This is the first of a series of at least three volumes which will form part of the larger, overall story of the medical activities of the military services during the past great conflict. Over five hundred pages are devoted to charts, graphs, and statistics of various epidemic type diseases, including four illustrations, ninety-one tables, and forty-eight charts, as well as a mass of data summarizing an overwhelming amount of archives material.

Much that was medically unknown before World War II is given excellent coverage, especially in the realm of the viral diseases. Diseases like coccidiomycosis and brucellosis were hardly known before the war.

If any one account were to be singled out by this reviewer, the story of tuberculosis by Esmond R. Long (another of the past presidents of the American Association of the History of Medicine) would be it. Not only does Dr. Long know the subject of tuberculosis from personal experience as teacher, practitioner, and author in the field, but his skill with the historical approach makes this contribution well worth publishing.

This book was not written for the benefit of historians. Practical medical men, viewing history only in its direct bearing on the subject at hand, have analysed the records, accumulated during the war, which are related to specific disease entities, with a view to preserving what will be of use in the present and future concern with these diseases as military problems. The medical history of the war from a classically historical point of view is still to be written.

SAMUEL X. RADBILL

THE BULLETIN RECENTLY RECEIVED *

Erwin H. Ackerknecht. *A Short History of Psychiatry.* Translated by Sulammith Wolff. New York and London: Hafner Publishing Company, 1959. vi + 98 pp. Ill. $3.50.

Jacopo Berengario da Carpi. *A Short Introduction to Anatomy* (*Isagogae Breves*). Translated with an introduction and historical notes by L. R. Lind. Chicago: The University of Chicago Press, 1959. xi + 228 pp. Ill. $5.00.

Brompton Hospital Reports. Vol. 27, 1958. London: Lloyd-Luke (Medical Books) Ltd. x + 277 pp. Ill. 15 shillings.

Chandler McC. Brooks and Paul F. Cranefield. *The Historical Development of Physiological Thought,* A Symposium Held at the State University of New York Downstate Medical Center. New York: The Hafner Publishing Company, 1959. xiii + 401 pp. Ill. $6.00.

Mabel Blake Cohen (Editor). *Advances in Psychiatry.* Recent Developments in Interpersonal Relations. New York: W. W. Norton & Company, Inc., 1959. 314 pp. $4.95.

Ruben Eriksson (Editor). *Andreas Vesalius' First Public Anatomy at Bologna, 1540.* An Eyewitness Report. (*Lychnos-Bibliotek 18*). Uppsala and Stockholm: Almqvist & Wiksells Boktryckeri AB, 1959. 344 pp. Ill. 45 Swedish Kronor (47 Swedish Kronor bound).

Gonzalo Fernández de Oviedo. *Natural History of the West Indies.* Translated and edited by Sterling A. Stoudemire. University of North Carolina Studies in the Romance Languages and Literatures, Number 32. Chapel Hill: The University of North Carolina Press, 1959. xvii + 140 pp. Ill. $2.50.

Thomas Geminus. *Compendiosa totius anatomie delineatio.* A Facsimile of the First English Edition of 1553 in the Version of Nicholas Udall. With an introduction by C. D. O'Malley. London: Dawson's of Pall Mall, 1959. Ill. £12.10s.

Georges Guillain. *J.-M. Charcot, 1825-1893,* His Life—His Work. Edited and translated by Pearce Bailey. New York: Paul B. Hoeber, Inc., 1959. xvi + 202 pp. Ill. $7.00.

Ernest Harms. "Idealogical Interpretation of Sigmund Freud's Development versus Freud Mythologies." Reprinted from *Studium Generale,* 1958, *12*: 763-767.

Erna Lesky. "Österreichisches Gesundheitswesen im Zeitalter des aufgeklärten Absolutismus." *Archiv für österreichische Geschichte,* 122. Band. 1. Heft. Wien: Rudolf M. Rohrer, 1959. viii + 228 pp. 82.50 Austrian shillings.

Carlos Martinez Duran. *Federico Chopin* o el triunfo del espíritu sobre la carne. Universidad de San Carlos de Guatemala Colección de Autores Guatemalenses "Carlos Wyld Ospina," Volumen Numero 2. Guatemala: Imprenta Universitaria, 1958. 266 pp. Ill.

André Maurois. *The Life of Sir Alexander Fleming,* Discoverer of Penicillin.

* The *Bulletin* reserves freedom of decision as to the publications to be listed in this section. Items received, other than those assigned for review, are ultimately incorporated into the collection of the Institute of the History of Medicine.

Translated from the French by Gerard Hopkins. New York: E. P. Dutton & Co., Inc., 1959. 293 pp. Ill. $5.00.

Elie Metchnikov. *Souvenirs,* Recueil d'articles autobiographiques. Moscow: Editions en Langues Etrangères, 1959. 327 pp. Ill.

Suessmann Muntner (Editor). Moshe Ben Maimon (Maimonides) *Medical Works,* Vol. II: (*Medical*) *Aphorisms of Moses* in Twenty Five Treatises. Hebrew Translation by R. Nathan Hameathi (1283). Jerusalem: Mosad Harav Kook, 1959. xxxii + 470 pp.

G. S. Pondoev. *Notes of a Soviet Doctor.* New York: Consultants Bureau, Inc., 1959. iii + 238 pp. $4.95.

Max Rinkel and Harold E. Himwich (Editors). *Insulin Treatment in Psychiatry.* (Proceedings of the International Conference on the Insulin Treatment in Psychiatry held at the New York Academy of Medicine, October 24 to 25, 1958). New York: Philosophical Library, 1959. xxiii + 386 pp. Ill. $5.00.

Francisco Sanchez Capelot. *La obra quirurgica de Francisco Dias.* Salamanca, 1959. Publicaciones del Seminario de Historia de la Medicina de la Universidad de Salamanca. Serie A, Estudios, Tomo II, Num. 4, pp. 191-221.

Rafael Sancho de San Roman. *La obra psiquiatrica del Doctor Pi y Molist.* Salamanca, 1959. Publicaciones del Seminario de Historia de la Medicina de la Universidad de Salamanca. Serie A, Estudios, Tomo II, Num. 5, pp. 229-248.

Rafael Sancho de San Roman. *Vida y obra de Gaspar Casal.* Salamanca, 1959. Publicaciones del Seminario de Historia de la Medicina de la Universidad de Salamanca. Serie A, Estudios, Tomo II, Num. 3, pp. 157-183.

Glenn Sonnedecker, J. Hampton Hoch, Wolfgang Schneider. *Some Pharmaco-Historical Guidelines to the Literature.* Madison, Wisconsin: American Institute of the History of Pharmacy, 1959. Republished from the *American Journal of Pharmaceutical Education, 23* (1959), 143-172. $.50.

Mary W. Standlee. *The Great Pulse,* Japanese Midwifery and Obstetrics through the Ages. Rutland, Vermont and Tokyo, Japan: Charles E. Tuttle Company, 1959. 192 pp. Ill. $4.50.

Fritz Steckerl. *The Fragments of Praxagoras of Cos and His School.* Leiden: E. J. Brill, 1958. ix + 132 pp. 12.50 guilders.

Lloyd G. Stevenson. *The Meaning of Poison.* (Logan Clendening Lectures on the History and Philosophy of Medicine. Seventh Series). Lawrence, Kansas: University of Kansas Press, 1959. 53 pp. $2.00.

D. P. Walker. *Spiritual and Demonic Magic from Ficino to Campanella.* Studies of the Warburg Institute edited by G. Bing, Vol. 22. London: The Warburg Institute University of London, 1958. vi + 244 pp. £2.

A Way of Life and Selected Writings of Sir William Osler. With an introduction by G. L. Keynes. New York: Dover Publications, Inc., 1959. xx + 278 pp. Ill. $1.50.

Znamenatel'nye daty istorii meditsiny 1959 goda. (Memorable dates in the history of medicine of the year 1959). Sostaviteli: I. V. Vengrova, T. V. Gusakova, I. A. Zinov'ev, T. G. Polîanskaîa, E. N. Fokina. Moscow: Gosudarstvennoe izdatel'stvo meditsinskoî literatury, Medgiz, 1959. [Institut organizatsii zdravookhraneniîa i istorii meditsiny imeni N. A. Semashko ministerstva zdravookhraneniîa SSSR.]

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